Research Note 84-116

ANALYSIS OF MILITARY ORGANIZATIONAL EFFECTIVENESS (AMORE) APPLE II COMPUTER VERSION: USER'S HANDBOOK

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This handbook is intended to introduce the user to the fundamental concepts of the Analysis of Military Organizational Effectiveness (AMORE) methodology and to explain the programs and procedures for implementation of the Apple computer version of the AMORE model. The methodology was developed as a means to examine the capability of a military unit to reconstitute itself as a function of time after degradation of personnel and/or materiel. The software and source code for use on the Apple II®, IIe, and III (in the Apple II Emulator Mode) computers are available through the TRADOC Research Element at Monterey (TREM).

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PREFACE

The purpose of this manual is to provide users of the Analysis of Military Organizational Effectiveness (AMORE) methodology with information on its fundamental concepts, the associated Apple computer software, and the operational procedures required for its use. The methodology was developed as a means to examine the capability of military units to reconstitute as a function of time after experiencing degradation of personnel and/or materiel. This manual is directed toward those who desire to employ the AMORE methodology as an analysis tool using the Apple computer.

The software will operate on the Apple II+, Apple IIe, and Apple III (in the Apple II Emulation Mode) computers. The software is available on two floppy disks. Copies of the disks may be obtained by sending two blank disks and a written request to:

Chief
TRADOC Research Element (TREM)
Naval Post Graduate School
P.O. Box 8692
Monterey, CA 93940

This manual is organized into seven chapters. The first six chapters examine in detail the primary capabilities of the model, most of which are available on the first floppy disk. Chapter 7 examines the ancillary utilities on the second disk which expand or enhance the primary capabilities.

- Chapter 1 briefly discusses military organizational assessment and the AMORE methodology. Definitions of terms used throughout the manual are included in this chapter.

- Chapter 2 introduces the AMORE Apple computer model.

- Chapter 3 contains the information needed by the analyst to develop input data for the AMORE model using the Preprocessor developed for the Apple version. (See also Chapter 7.)

- Chapter 4 teaches the details of user operations for the Organizational Capability Simulator. This simulator transforms Preprocessor outputs (Chapter 3) into organizational capability and assignment patterns.

- Chapter 5 teaches the details of user operations for the Time Capability Simulator. This simulator translates assignment and time constant patterns from the Organizational Capability Simulator into organizational time dependent capability.

- Chapter 6 combines time dependent capabilities for personnel with those for materiel to develop a coordinated unit capability. These capabilities are stated with 90% confidence intervals.

- Chapter 7 discusses user utility programs which assist redimensioning, team building, personnel performance degradation analyses, capability file analysis, and linked survivor development.

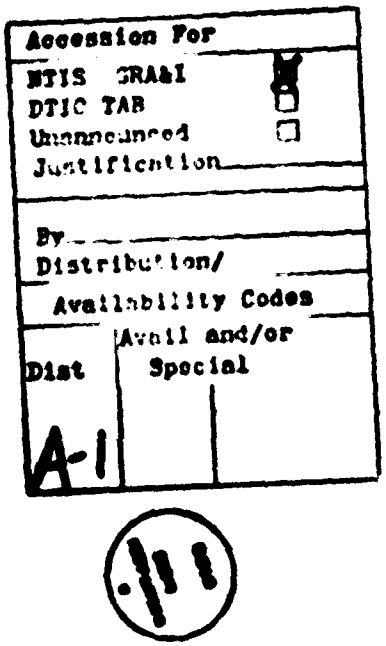


TABLE OF CONTENTS

CHAPTER 1
THE AMORE METHOD

1.1 INTRODUCTION

The purpose of the Analysis of Military Organizational Effectiveness (AMORE) methodology is to assess military unit capability as a function of time after suffering losses or other degradation of personnel and materiel assets. The methodology combines in-depth analysis of the unit's functions with a computer model to characterize the response over time of the unit to simulated combat losses or other degradation such as that due to a chemical environment. The AMORE method provides an improved measure of effectiveness for military organizational response to resource changes. It does not assume that capability loss is proportional to resource loss. In fact such proportionality is a rare exception.

Most methods for quantifying unit combat effectiveness rely almost exclusively on attrition counts. These methods determine the number of personnel or items of materiel affected by some degrading mechanism (e.g., conventional or nuclear munitions, peacetime readiness shortfalls) and then use the counts to assess the resultant effectiveness of the unit. Usually, some level of personnel attrition (e.g., thirty percent) is judged adequate to either defeat the target or to reduce remaining capability to specified levels. In some instances, a level of materiel degradation is employed, while in others, personnel or both personnel and materiel levels of attrition are recorded and the analyst is usually left with the task of somehow judging what that all means. Even when both materiel and personnel counts are considered together, they are rarely combined logically in a manner which leads to a credible measure of the unit's overall remaining effectiveness potential.

Furthermore, equating attrition counts with capability levels ignores the fact that unit effectiveness is likely to be time variant. Usually, a military unit can increase capability after attack by judicious reorganization of remaining resources. Failure to consider unit recon-

stitution potential leads to an inaccurate measure of unit effectiveness and ignores significant variation among unit types.

Figure 1.1 shows graphically the inadequacy of using attrition counts to measure effectiveness. In this figure, different unit responses are compared within a composite plot of unit capability as a function of time. Figure 1.1 clearly illustrates that different units inflicted with the same level of damage (attrition count) behave quite differently. Some units are impacted much more than others initially; moreover, different units recover to different levels and do so at quite different rates. The added dimension of the AMORE measure of effectiveness highlights many more facets of a unit's capability. It is clear that the results and conclusions obtained through the use of AMORE will often differ in significant ways from those obtained by simply measuring unit attrition.

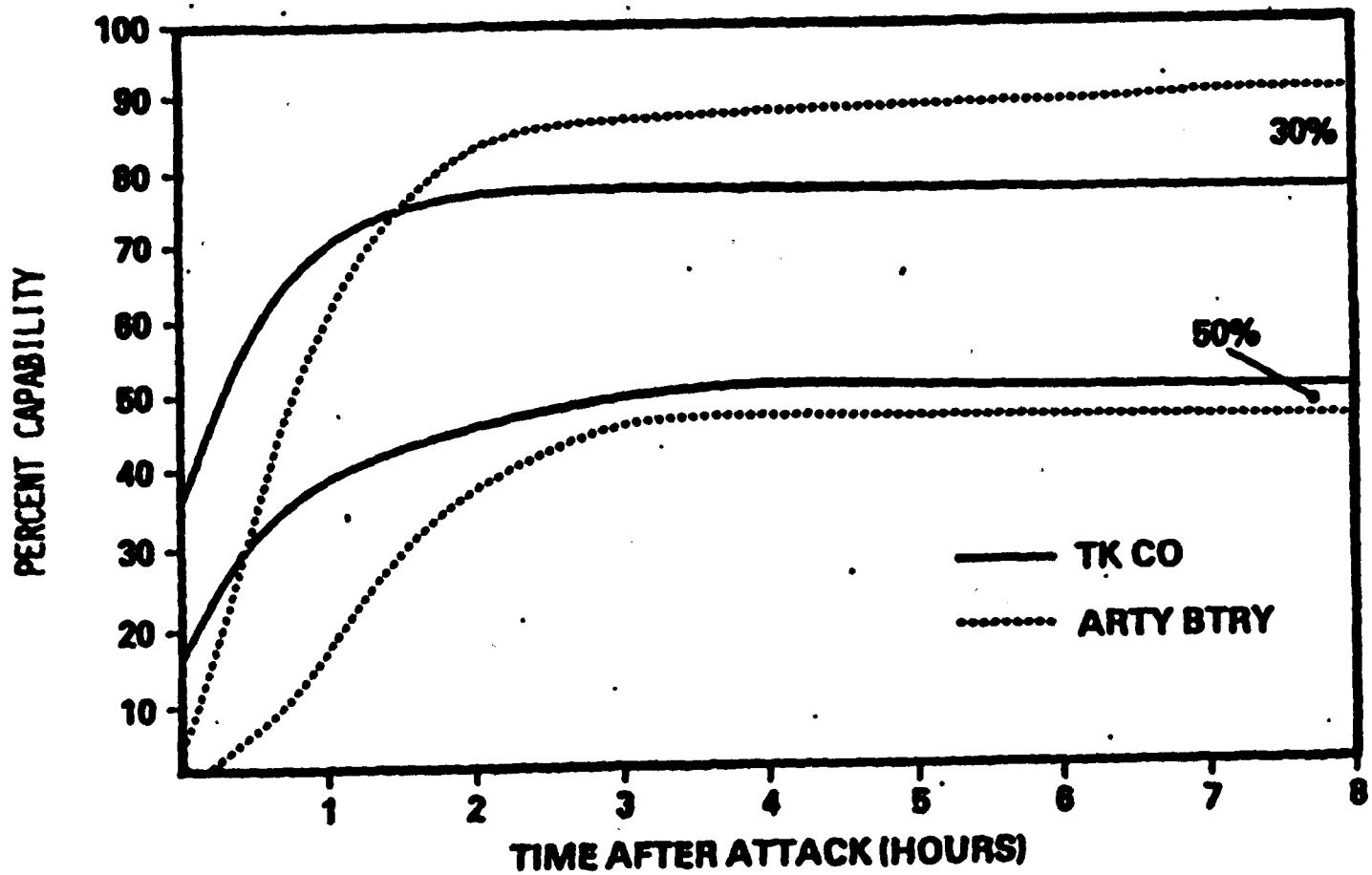
The AMORE approach was conceived and designed specifically to deal with the deficiencies described above. Accordingly, the method possesses the following features:

- Assesses the joint effect of personnel casualties and materiel damage upon the organization.
- Measures effectiveness as a function of time after the initial degradation.

1.2 AMORE METHODOLOGY OVERVIEW

The AMORE method provides a detailed basis for analysis of an organization. When using the methodology, organizational analysts study the unit and its missions in order to incorporate both in the measurement of unit capability. The unit capability measurements obtained through the AMORE methodology are realistic measures of effectiveness for organizations which consider the interaction of personnel and equipment over time. The methodology requires identification of the functions which are needed in order to accomplish the mission. Personnel and materiel needed to perform each function are divided into teams. Teams are constructed with the

RESPONSE TO SAME LEVEL OF PERSONNEL INCAPACITATION*



*WITH ASSOCIATED EQUIPMENT DAMAGE

Figure 1.1. Unit Response Comparison

assets needed for various levels of unit operational capability, and this represent fractions of unit capability. These teams are then reduced to essential teams by stripping them of any people or equipment which are not absolutely necessary for mission accomplishment. Bare essential team increments are called Mission Essential Teams or METs.

Once the METs for the unit and mission under consideration have been established, degradation of unit and its reorganization may be simulated. People or equipment with the potential for acceptible performance in other jobs may be assessed time penalties to come up to speed for the new task. They are then reassigned so that the unit can come as close to its pre-degradation level of capability as possible and as quickly as possible. The number of essential teams available to the unit at selected times during the reorganization process provides a measure of capability at those times.

An outline of the AMORE methodology is shown graphically in Figure 1.2. The following text addresses this figure. The box numbers referred to in the text are the numbers in parenthesis in the figure.

The first step in exercising the AMORE methodology is the definition of the mission/posture combination (Box 1). The choice of mission is fundamental to the establishment of essential teams (a result of the functional analysis, Box 2) and the posture is crucial when establishing Probability of Degradation (PD) (Box 3). Often in practice, a unit is studied in a variety of mission/posture combinations by use of alternative sets of team requirements and the application of alternative PD sets.

The functional analysis (Box 2) is a detailed study of both the unit TOE (or other organizational representation) and the unit mission. Initially, the functions required by the mission are identified and the initial strengths of personnel and materiel required by the TOE are specified. One of the objectives of the functional analysis is to relate the assets of the unit to the functions required by the mission. The assets are then partitioned into teams, i.e., increments of capability, each of which contribute to mission accomplishment.

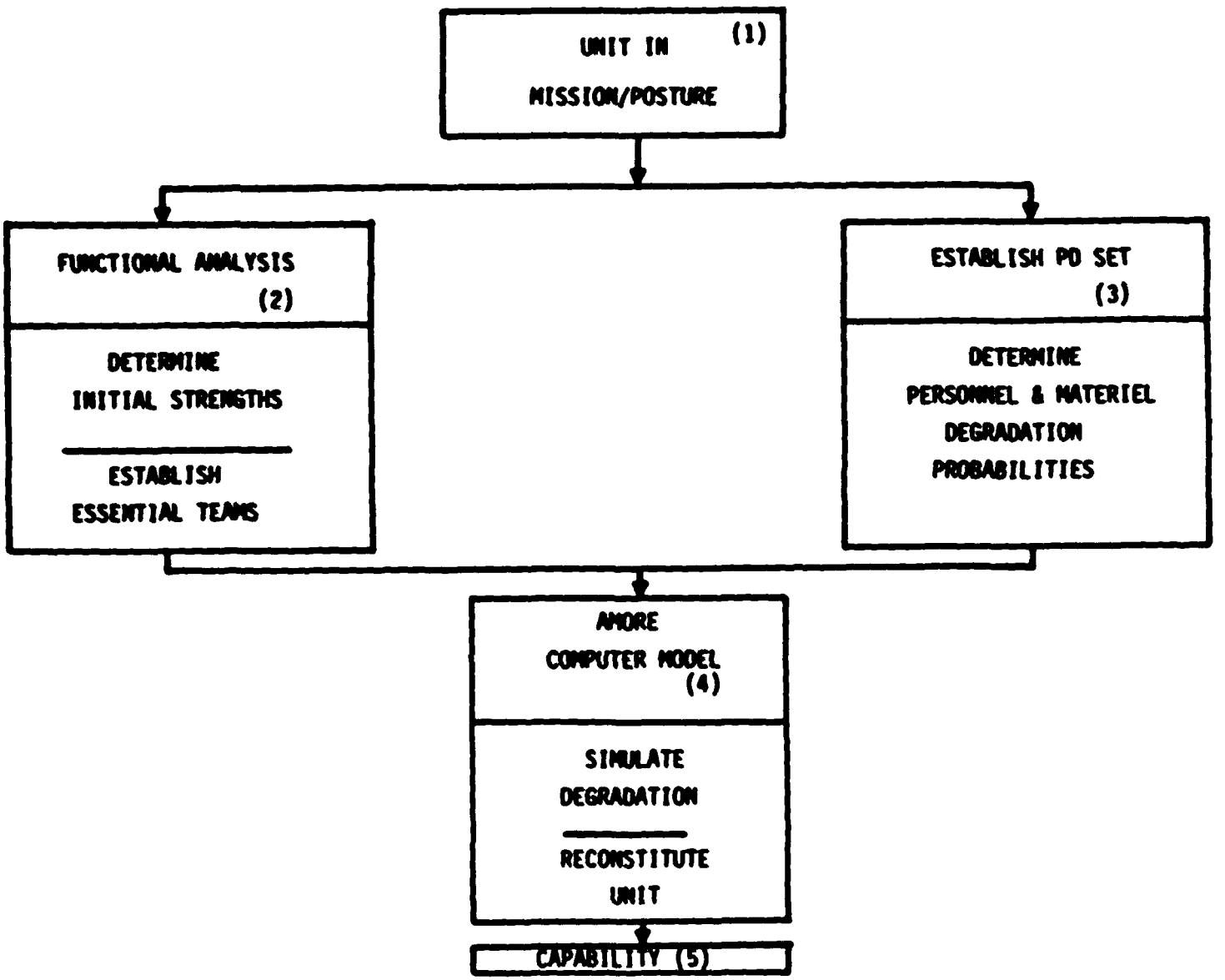


Figure 1.2. AMORE Methodology

The analyst must examine each of the teams and establish which of the personnel and equipment in that team are absolutely essential for mission accomplishment. Thus, as a hypothetical example, the crew of an artillery battery might consist of ten personnel, but only five are absolutely essential for firing operations and an additional five for sustained support. This minimum complement of personnel serves to define a "bare bones" element. The "bare bones" elements are called mission essential teams (METs). Note that each MET is comprised of both personnel and associated items of equipment required to perform some portion of the mission.

Simultaneous with the examination of the organization's anatomy and its dissection into teams is the determination of probabilities of degradation for personnel and materiel (Box 3). The effect of the degrading mechanism on a unit with the assumed mission and posture must be evaluated to determine the personnel and materiel degradation probabilities. These effects may vary between personnel skill groups and equipment types due to inherent differences in personnel postures and equipment vulnerabilities. A variety of methodologies may be used for the evaluation. The universally accepted Joint Munitions Effectiveness Manual (JMEM) methodologies are commonly used to establish probabilities of degradation from simulated attacks. Another commonly used practice is to analyze degradation parametrically.

This information is input to the AMORE computer model (Box 4). The model simulates both the degradation of the unit (in accordance with the PD's input) and the post-degradation regrouping of personnel and materiel into the maximum number of essential teams (according to the requirements input, Box 2). Degradation is assessed using a Monte Carlo technique together with the input probabilities. Regrouping, or reconstitution, requires a knowledge of which of the individuals in the unit can be used or substituted for various skills, and also which items of equipment are substitutable for other items. Further, when substitutions are feasible, times required for decisions to substitute and the times it takes to consumate substitutions are considered. In the case of personnel, the

times it will take replacements to come up to speed in performing the new tasks are also considered. These and many other pertinent times are all considered so that the gradual buildup of unit effectiveness becomes expressible as a function of time. The analyst may then study impacts of policies or practices which modify these times.

The problem of unit reorganization becomes one of making optimal personnel and materiel assignments based on the available substitutions to fulfill the commander's objective. A transportation algorithm is used because of the supply and demand nature of the problem, as well as the requirement that all assignments be integral.*

Following degradation, some of the teams have lost essential team members and are no longer capable of performing their mission. The number of teams which remain operational is the measure of the unit's initial capability. Increasing capability requires the reorganization and reconstitution of METs. Thus, regrouping of personnel and materiel to maximize the number of MET's is one of the commander's main objectives. Another objective is to minimize the average time required to reach that capability.

METs which are reconstituted in time represent the recovery of capability by the unit. The stochastic processes used by the model necessitate the evaluation of multiple iterations of the process. Results for all iterations are averaged to develop an expected value of unit capability (Box 5) for the defined mission(s) and the simulated degradation. Figure 1.1 is typical of the results obtained, showing unit capability as a function of time, and illustrates the differences of unit types and their response to the same level of degradation.

* While assignments are integral, non-linear degradation of the performance of those assignments may be assessed.

The AMORE software is designed to provide other information in addition to capability as a function of time. The model will identify those personnel skills and equipment items which precluded obtaining a desired level of unit capability. Further, the assignments which were made in order to achieve the capability levels output are tracked and may be output for analysis. Thus, AMORE provides data for an in-depth analysis of the weaknesses, and the strengths, of a unit.

The AMORE methodology provides a measure of an organizational capability considering the organization as a system of both personnel and equipment interacting over time. The methodology is sensitive to:

- Differences in degrading effects
- The specific capabilities of individual personnel and equipment items
- The interaction of the personnel and equipment to form teams which contribute to organizational capability
- Time penalties associated with post degradation reconstitution.

1.3 DEFINITION OF TERMS

Assignment Matrices	An Organizational Capability Simulator option.
Ref: Chapter 4	This option processes and prints assignment matrices, which contain the average over all iterations of the optimal allocation of resources.
Capability	Capability is the fraction of total essential teams that a unit is able to reconstitute within some time following degradation. Capability is calculated and output for times specified by user.
Ref: Chapter 5-indiv Chapter 6-coord	

Choke Analysis	An Organizational Capability Simulator option.
Ref: Chapter 4	This option determines the personnel skills and equipment items which prevented reaching specified capability. It also determines the materiel and personnel surplus to a specified capability level.
Choke Point	A personnel skill or equipment item identified as critical by the Choke Analysis.
Commander's Reaction Time	See Decision Time.
Critical Personnel Skill (Equipment Item)	A personnel skill (or equipment item) which would be needed to reach a specified capability level. Critical skills and items are identified in the Choke Analysis.
Decision Time	A Preprocessor input.
Ref: Chapter 3 - Input Chapter 4 - Assignment Chapter 5 - Capability Analyses	Also called commander's reaction time. A delay time imposed upon transfers between personnel skill groups and between equipment types which models the time it takes a commander to assess the condition of the unit and to decide how to reorganize. NOTE: The delay time is not imposed upon transfers within a skill group or equipment type.
Degradation	The simulated loss or lowering of the quality of performance of unit resources.
Ref: Chapter 3-Normal Input Chapter 7-Spec Situations	
Equipment Type	A Preprocessor input.
Ref: Chapter 3	A category of unit materiel which contains all equivalent equipment items. (Items within the same equipment type are interchangeable.)
Essential Teams	A Preprocessor input.
Ref: Chapter 3 - Input	The breakdown of the unit into components (teams) which contain only the personnel and materiel that are absolutely necessary to mission accomplishment. Referred to as the MET.

Functional Analysis Ref: Chapter 3-Normal Input Chapter 7-MET Build	A detailed study of a unit and mission to identify the functions, skills and equipment needed to carry out the mission and to determine how the unit actually performs the functions.
Infinite Time Capability	See Maximum Capability.
Initial Capability Ref: Chapter 5	A Time Capability Simulator output. Also called zero time capability. The capability immediately after degradation, but before reconstitution of the unit begins.
Initial Strength Ref: Chapter 3	A Preprocessor input. The pre-degradation inventories of personnel within each personnel skill group and materiel within each equipment type. Initial strengths are the units original supply.
Input Only Ref: Chapter 3	A Preprocessor option. The Preprocessor can read an input file at any time for print out or edit.
Iteration Ref: Chapter 4	A single replication of the Organizational Capability Simulator.
Light Damage Ref: Chapter 3-Normal Input Chapter 7-Linked Cases	A damage level for equipment. Light damage can be repaired by the operator or within the crew. Light damage requires an input PD and repair time for each equipment type.
Line Number Ref: Chapter 3	The index numbers for the personnel skill groups and the equipment types (automatically added during preprocessing).
Maximum Capability Ref: Chapters 4, 5, 6	Organizational Capability, Time Capability Simulator, and Capability Coordination Module Outputs. Also called Infinite Time Capability. Capability when all possible transfers and all possible equipment repairs have been made.

Mean Time Only	A Time Capability Simulator option.
Ref: Chapter 5	This option allows the user to designate how the input time values (transfer, decision, repair) are to be used. Expected value - use the times as is as input. Random - use the input times as the mean values of an exponential distribution and draw all time values from that distribution.
Minimum Capability	Organizational Capability, Time Capability Simulator, and Capability Coordination Module outputs.
Ref: Chapters 4, 5, 6	Capability evaluated immediately after the start of the reconstitution. All transfers are in progress, but only those with a total time (transfer + decision + repair) of zero have been completed.
Moderate Damage	A damage level for equipment.
Ref: Chapter 3-Normal Input Chapter 7-Linked Cases	Moderate damage can be repaired within the unit, but not by the crew. Requires an input PD and repair time for each equipment type.
Number of Iterations	An Organizational Capability Simulator feature.
Ref: Chapter 4	This feature allows the user to specify the number of iterations for each AMORE run. It is automatically carried through to the Time Capability Simulator.
Personnel Skill Group	A Preprocessor input.
Ref: Chpater 3	A category of unit personnel which contains all the people with common skills, capabilities, and vulnerabilities. (Personnel within the same skill group are interchangeable.)
Probability of Degradation (PD)	A Preprocessor input.
Ref: Chapter 3	This input set contains the probabilities of degradation for each personnel skill group and equipment type.

Reconstitution Ref: Chapter 4, 5, 6	The simulated reorganization of the unit into METs. The reorganization is designed to achieve the maximum number of teams in the minimum time.
Repair Time Ref: Chapter 3	A Preprocessor input. The expected time to repair light and/or moderate materiel damage is entered into the AMORE model for every equipment type.
Severe Damage Ref: Chapter 3	A damage level for equipment. Severe damage cannot be repaired by the unit. Items with severe damage are lost to the unit for the time being considered.
Team (MET)	An increment of capability. The absolute minimum of people and equipment which can perform the functions of a team is called a Mission Essential Team or MET.
Times at Which to Evaluate Capability. Ref: Chapter 5	A Time Capability Simulator input. Also called Time Slices. The times specified by the user or the default values at which capability is evaluated.
Time Slices	See Times at Which to Evaluate Capability.
Transfer Matrix Ref: Chapter 3	A Preprocessor input. A matrix containing the expected transfer penalties for either personnel of a skill group to substitute into other skill groups or equipment of a type to substitute into other equipment types.
Transfer Penalty	The elements of a transfer matrix. These penalties are the expected costs required for the substitution to become operational at an acceptable level of competence.

Transportation Algorithm (Munkres' Algorithm)	A standard network algorithm used to solve the AMORE reassignment problem. A knowledge of the algorithm is not essential for the user.
Zero Time Capability	See Initial Capability.

CHAPTER 2
AMORE APPLE MODEL OVERVIEW

2.0 INTRODUCTION

The version of the AMORE model that was developed for the Apple Computer requires no programming capabilities on the part of the user. The user can operate the software unassisted by referring to this manual. He should know how to get the Apple Computer running, how to insert floppy disks, and how to turn on a printer and display video screen. With a few exceptions the Apple AMORE model system is a "turn key" operation.

This manual provides alternative start points (where necessary) with a few simple commands such as "RUN PREP" which the user types in and enters. Additional options are automatically presented and the user need only follow instructions displayed on a screen. Whenever the user is prompted by the software for an entry, he can break at that point by entering "Control C". He can usually continue by typing and entering "GOTO 400" (saves data) or "RUN" (initializes and starts anew).

The flow of the Apple version of AMORE may be best understood by referring to the diagram in Figure 2.1.

There are 13 key elements as portrayed by Figure 2.1 and they may be classified as inputs, outputs or programs.

The double-bordered boxes are the four main programs of the Apple AMORE system. Each transforms inputs into outputs for later stages or analyses. AMORE was divided into these four programs to better manage a relatively limited memory and to conserve running time where possible.

In each block at Figure 2.1 there are two sets of numbers at the bottom. The left set refers to subsequent chapters where the block is described in sufficient detail to facilitate user operation. The right set of numbers refers to paragraphs in this chapter which briefly describe the block purpose and operations.

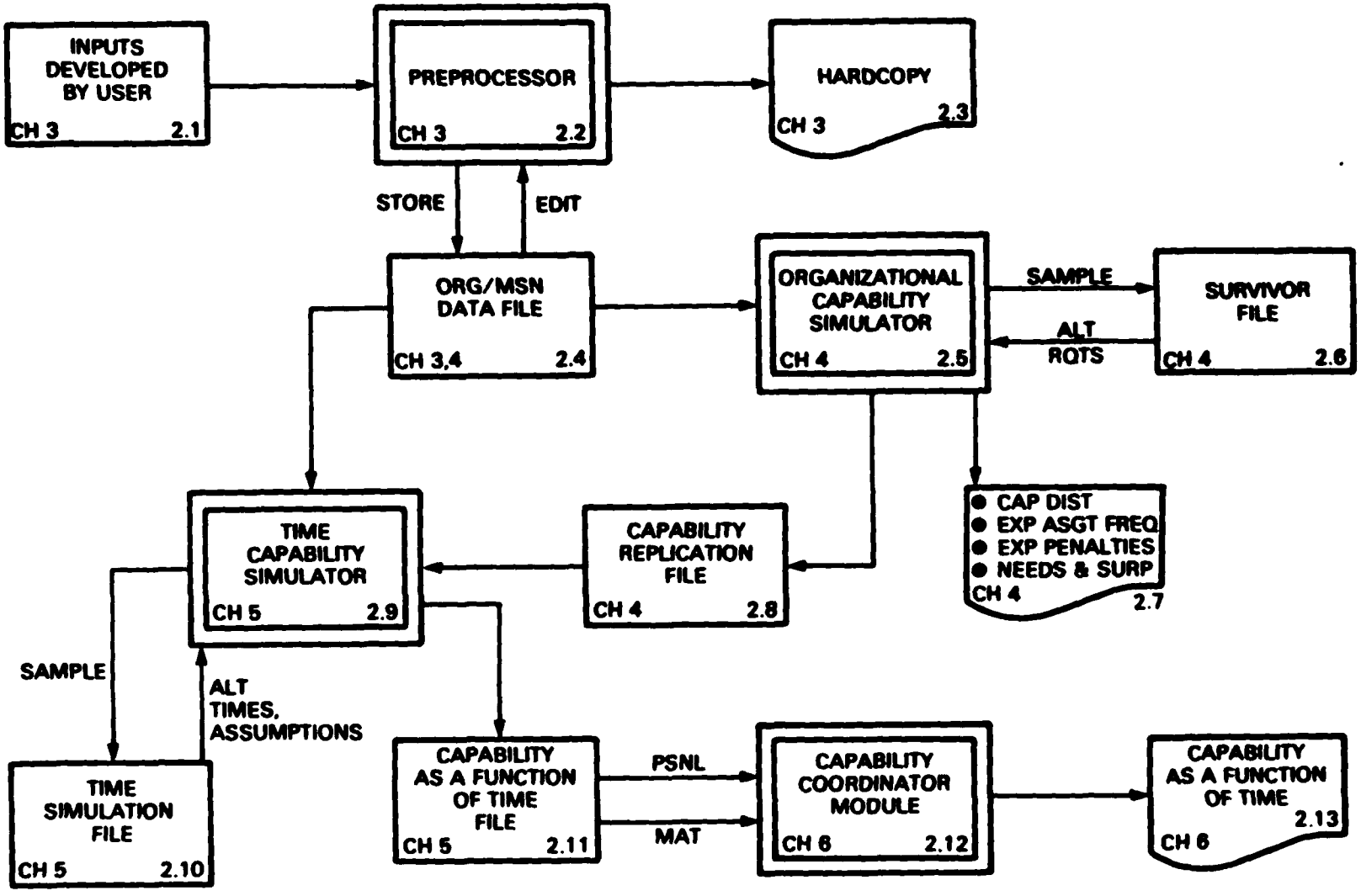


Figure 2.1 AMORE APPLICATION USING APPLE COMPUTER

There is a separate chapter for each of the main Programs of the Apple AMORE Model System. Each provides a walk through to familiarize the user with model capabilities. The Preprocessor is described in Chapter 3; the Organizational Capability Simulator in Chapter 4; the Time Capability Simulator in Chapter 5; and the Capability Coordinator Module in Chapter 6.

2.1 INPUTS DEVELOPED BY USER

By applying the concepts developed in Chapter 1 (the AMORE Method), the analyst develops a series of input constructs which reflect the mission, functions, and structure of a unit to be analyzed.

There are certain inputs developed for both personnel and materiel line items. These are:

- The Mission Essential Team Increments (METs)
- The Substitution Table or matrix
- Initial Strength
- Degradation Probabilities
- Commander's Reaction Times.

In addition to these, materiel inputs require

- light and moderate damage probabilities
- light and moderate damage repair times.

All of these required constructs and their origins are discussed conceptually in Chapter 1 and operationally in Chapter 3.

2.2 PREPROCESSOR

The Preprocessor Program enables a non-programming analyst to build and store an Organization/Mission Data File for further analysis. We will refer to this as the Unit Data File.

The program permits storing an incomplete file for later work or editing an existing file to reflect correction or alternate concepts. Alternate files may be stored under alternate names.

At any time the Preprocessor permits display of the state of the user input data on the Apple video screen, or in hard copy from a printer.

When the user runs the Preprocessor Program (or causes it to run by an appropriate entry in another program), he has an immediate choice of calling in an existing file or not.

If he decides to call an existing file he next names the file and it is automatically entered. The entry of an existing file automatically sets the "right" dimensions for the Preprocessor.

If the user decided not to read a file he then chooses whether he will enter personnel or materiel data. Separate files are developed for each to conserve computer memory. They are "run" separately in the Organizational Capability Simulator and the Time Capability Simulator and can be joined in the Capability Coordinator Module.

At any time, while using the Preprocessor, the analyst may create a new file reflecting the data resident in the Apple Memory. Alternatively he may effectively write over an old file.

Chapter 3 provides a guided tour of the Preprocessor.

2.3 HARDCOPY

At anytime, by using a printer, the analyst may use the Preprocessor Program to print out organizational AMORE data resident in the Apple memory. Each of the formats will automatically be titled with a case lable of the user's choosing.

2.4 ORGANIZATION/MISSION (UNIT) DATA FILE

This is an automatically formatted data file created by the analyst using the preprocessor.

It can be recalled by the preprocessor at any time to edit or develop alternatives. When any file is developed by the Apple/AMORE Model System, it will automatically be locked to prohibit inadvertant erasure. The file will contain all the AMORE construct data and dimensions. Separate files are created for personnel and materiel. The file can be called by the Organizational Capability Simulator at the analysts option or automatically by the Time Capability Simulator to assure case consistency and correlation. Portions of the AMORE Model System also develop file audit trails.

When called upon by the Organizational Capability Simulator, the unit data file automatically loads MET data, substitutions, times, strengths, and degradation probabilities.

2.5 ORGANIZATIONAL CAPABILITY SIMULATOR

The function of this program is to accept a user designated AMORE organization/mission data file and transform this data into unit capability distributions, expected assignment frequencies, expected assignment penalties, and (at the user's option) line item needs and surplusses.

Chapter 4 provides a guided tour of this simulator.

During the processing stages, the simulator program allows the user to save or call a survivor file. The first time through the simulator can develop a set of survivors for each replication (number of replications specified by user) by sampling the initial strength using the degradation probabilities.

The analyst may save this set of survivors in a survivor file. He may have developed alternate METs or alternate substitutions while using the preprocessor and can test them against the same survivors.

The Organizational Capability Simulator operates in two stages. The first stage develops capability distributions, expected assignment frequencies and expected assignment penalties. Prior to returning the user to a menu of options, the program asks whether to build a capability file for later processing in the Time Capability Simulator. For certain analyses, or stages of analyses, the user may not need to invoke this capability. He will need to, however, if he wishes to measure capability as a function of time or if he wishes to coordinate personnel and materiel capability.

The user may also re-solve for first-stage capability distributions using different numbers of replications or different survivor files.

Each time he will be given the option to save a capability file for Time Capability Simulator processing.

The second stage of the Organizational Capability Processing is also an optional one which calculates needs and surplusses. When the analyst invokes the solution of needs and surplusses he is asked to specify a goal capability (team) level. He may re-solve as often as he pleases, choosing different capability goals. The needs and surplusses solution then relates to the stated goal. Any printout of needs and surplusses reflects the team goal.

If the analyst re-solves for capability distributions, assignment frequencies, and assignment penalties; the needs and surplusses array is automatically scrubbed.

2.6 SURVIVOR FILE

A survivor file may be saved whenever unit strength is sampled with degradation probabilities input from the unit data file or created

within the Organizational Capability Simulator program. The user may also save a survivor after all calculations have occurred. However, if he saves it after saving a capability file, the capability file will not carry the audit of the survivor file name.

As a changed case is run a saved survivor file may be called. This tests new concepts (i.e., changed METs, substitutability, reaction or repair times) against an unvarying sample of survivors. Care must be exercised when doing this to assure that the sample is sufficient and representative. But when a saved survivor file is reused minor stochastic "noise" is eliminated. Changes in capability distributions can then be related directly to changes in concepts.

A survivor file should not be recalled for cases where the initial manning is changed in either strength or composition; or where degradation probabilities are changed. These kinds of changes should normally produce a different pattern of survivors.

2.7 HARD COPY ORGANIZATIONAL CAPABILITY RESULTS

At any time following the simulation the user may cause the capability distribution, assignment frequencies and assignment penalties to be printed out. Needs and surplus calculation results may also be printed for permanent retention, after that calculation is made.

2.8 CAPABILITY REPLICATION FILE

This file <u>implicitly</u> saves all assignments of all replications for a given case.

The analyst will not require capability versus time outputs for all cases. Therefore, the Time Capability Simulation program was separated from the Organizational Capability Simulation program to conserve memory and run time.

But saving all assignments for all replications explicitly could require a formidable disk file. The capability replication file avoids this need by using a string array to pack data. Additionally, it files only assignments off the main diagonal (skill or item transfers). The name of the input organization/mission data file is also saved together with the team capability attained for each replication. Later when the Time Capability Simulator is run it calls in the times and MET requirements from the input data file (name saved). By comparing MET requirements with capability attained, diagonal assignments can be implicitly reconstructed while minimizing disk storage space. The capability replication file also stores the name of any survivor file saved prior to saving a capability file.

This permits any printout of capability as a function of time to reflect

- o Survivor files used
- o Data files used
- o Case name

to automatically assure a consistant audit trail.

2.9 TIME CAPABILITY SIMULATOR

The Time Capability Simulator accepts a personnel or materiel capability file creates as described in paragraph 2.8. Additionally, the unit data file is read in to establish time penalties associated with each possible assignment.

For personnel, the Time Capability Simulator combines the substitution time penalty with the commander's reaction time. The user has a choice of two ways of applying this penalty (for each replication).

The expected value mode will simply add the times together as expected times, assess the penalty for each assignment and then rank order the return of resources from earliest to latest times.

The random mode uses the expected times as a basis to sample for simulated times using an exponential distribution. Then, as in the expected value case, penalties are assessed and resulting resource availability rank ordered.

For materiel the above two times are used in addition to equipment repair times. Comparable exptected and random modes are available to the user.

Next the Time Capability Simulator has the user select times of interest. For each replication the program determines team capability at that time based on resource time availability. Capabilities are then averaged across the replications for each selected time.

2.10 TIME SIMULATION FILE

The array of resource returns ordered by time may be saved at the user's option.

The wisdom of saving a time capability file is that the user may wish later to review capability with alternate times of interest and save computation time.

2.11 CAPABILITY AS A FUNCTION OF TIME FILE

The user needs to save one of these for personnel and separately for materiel in order to make a later coordinated comparison of capability.

Personnel capability as a function of time files may also be used in the personnel degradation utility program to see the impact of differential personnel productivity on unit capability (see Chapter 7).

2.12 CAPABILITY COORDINATOR MODULE

This program reads the capability as a function of time (CFT) files in together to derive coordinated unit capability.

The module will reject two personnel CFT files or two materiel CFT files.

The user can read in any personnel CFT together with a materiel CFT. But coordinated capability will only be shown where the numbers of teams and the number of replications are the same. Additionally capability will only be shown for common selected times of interest.

If team or replication numbers are different, the user may still see personnel and materiel capabilities compared. But he will see no coordinated unit capability.

The module takes the minimum of personnel or materiel teams for each replication as a coordinated unit capability measure.

2.13 CAPABILITY AS A FUNCTION OF TIME

The user can display (visually on the terminal or permanently using the printer)

- o zero time capability
- o minimum reconstitution capability
- o maximum capability

by replication for personnel, materiel and coordinated unit capability.

The user can also print personnel, materiel and coordinated unit capability as a function of time by

- o expected teams
- o percent of full teams

Or he can display or print personnel, materiel and coordinated unit CFT separately by expected teams and percent of full teams each with 90% confidence intervals.

CHAPTER 3
OPERATING THE PREPROCESSOR

3.0 OVERVIEW

This chapter will be a walk through the AMORE Apple Model Preprocessor. Typical sequences will be described and illustrated with expected video screen activity. When the computer is first turned on with a Volume 1 AMORE disk inserted, the first screen display is:

W E L C O M E

T O T H E

A M O R E

M O D E L S Y S T E M

25 OCTOBER 1983

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Figure 3.1

This program may also be initiated by typing in "RUN AMORE" at any time with a Volume 1 AMORE disk inserted. From this base program, any of the main AMORE system programs on the Volume 1 disk may be initiated. Appropriate programs may also be called from other programs. An alternate way to run the Preprocessor is by typing and entering "RUN PREP".

After a short delay the screen will display:

```
R U N   O P T I O N S

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     PREPROCESSOR

 2     ORGANIZATIONAL CAPABILITY

 3     TIME CAPABILITY

 4     CAPABILITY COORDINATION

 5     SURVIVABILITY LINKAGE

 6     STOP

ENTER YOUR CHOICE - 1
```

Figure 3.2

3.1 SELECT PREPROCESSOR

Note that we have entered Choice 1 to get the "PREPROCESSOR". After some moments of Disk Drive operation, where Figure 1 is again displayed, the name of the program is flashed on the screen with a message prompting the analyst to show a choice of reading in an existing file. In this case we will read in a file we have previously built and saved and so indicate by entering "FILE".

```
A M O R E

P R E P R O C E S S O R


IF YOU WISH TO READ IN A DATA FILE,

 ENTER THE WORD

  'F' 'I' 'L' 'E' - FILE


ENTER DATA FILE NAME - SCOUTP

READING IN SCOUT PLATOON - PERSONNEL

TOTAL MET REQUIREMENT
 BEING COUNTED BY TEAM
```

Figure 3.3

3.2 ENTER A FILE

The display next asks for the name of the file to be entered. Files created, saved and read into the Preprocessor are data files with a mixture of alphabetic and numeric information. The format is automatically set by the Preprocessor so as to be compatible with other AMORE programs.

The analyst enters a name he has previously chosen such as "SCOUTP" for the personnel data of the Scout Platoon. After some processing the display appears as in Figure 3.3 above.

The phrase "TOTAL MET REQUIREMENT BEING COUNTED BY TEAM" appears on the screen (briefly for a small unit). This reflects computer processing to save disk storage. Note that Figure 3.3 also contains the current label for the unit: "READING IN SCOUT PLATOON - PERSONNEL"

"PERSONNEL" is automatically added when the user selects the personnel option for preprocessing. At the moment we have bypassed that option by entering a previously constructed file.

3.3 DISPLAY USER OPTIONS

After brief processing Figure 3.3 yields automatically to Figure 3.4:

```
T E R M I N A L   O P T I O N S

 PREP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SEE LINE ITEM TITLES
 2     SEE CUMULATIVE MET
 3     SEE INDIVIDUAL MET
 4     SEE SUBSTITUTABILITY
 5     SEE INIT STR, CDR'S REACT TIME
 6     SEE PROBABILITY DEGRADATION

 7     EDIT OPTIONS
 8     LINEPRINT OPTIONS
 9     FILE AND PROGRAM OPTIONS

10     STOP
ENTER YOUR CHOICE - ?1
```

Figure 3.4

The first six options of Figure 3.4 provide the analyst with video displays of the unit data. By entering the number 8 (i.e. choosing "LINEPRINT OPTIONS") the analyst may lineprint hard copies of the data.

3.4 DISPLAY LINE ITEM TITLES

We will now step through the displays provided by entering the numbers 1 through 6. In Figure 3.4 we entered 1. This serves up Figure 3.5:

```
PREP - SCOUT PLATOON - PERSONNEL
 LINE ITEM TITLES

01 PLT LDR
02 PLT SGT
03 GUNNER
04 SCOUT
05 SCOUT DVR
06 SECT LDR
07 SQD LDR
08 GUNNER
09 SCOUT
10 SCOUT DVR
11 SCOUT

HIT 'ENTER' OR 'RETURN' TO CONTINUE -
```

Figure 3.5

This quickly displays the current line item titles. At any time the user may change these by going to the appropriate edit options beginning with choosing number 7 from the Figure 3.4 menu. Any editing (changing of alphabetic or numerical data) will first change that data in computer memory. Files called (as we did in Figure 3.3) remain as they are until changed through using the "FILE AND PROGRAM OPTIONS" entry in the menu of Figure 3.4. The analyst may create alternatives and store them on disk permanently in alternatively named data files. Any editing of line item titles will automatically add the line item number.

At the user's discretion any entry returns from the Figure 3.5 display to the menu of Figure 3.6:

```
T E R M I N A L   O P T I O N S

 PREP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO SET

 1     SEE LINE ITEM TITLES
 2     SEE CUMULATIVE MET
 3     SEE INDIVIDUAL MET
 4     SEE SUBSTITUTABILITY
 5     SEE INIT STR, CDR'S REACT TIME
 6     SEE PROBABILITY DEGRADATION

 7     EDIT OPTIONS
 8     LINEPRINT OPTIONS
 9     FILE AND PROGRAM OPTIONS

10     STOP

ENTER YOUR CHOICE - ?2
```

Figure 3.6

3.5 DISPLAY CUMULATIVE MET

By entering 2, we display the cumulative Mission Essential Teams (MET). Because of Apple II+ screen size limitations it appears in two sections (Figures 3.7 and 3.8).

```
PREP - SCOUT PLATOON - PERSONNEL
 CUMULATIVE MISSION ESSENTIAL TEAMS

                  TM1   TM2   TM3   TM4   TM5

01 PLT LDR         0     0     0     1     1
02 PLT SGT         0     0     0     0     0
03 GUNNER          0     0     0     1     1
04 SCOUT           0     0     0     1     1
05 SCOUT DVR       0     0     0     1     1
06 SECT LDR        0     1     1     1     2
07 SQD LDR         1     1     2     2     2
08 GUNNER          1     2     3     3     4
09 SCOUT           1     2     3     3     4
10 SCOUT DVR       1     2     3     3     4
11 SCOUT           1     2     3     3     4

TOTAL              5    10    15    19    24

HIT 'ENTER' OR 'RETURN' TO CONTINUE -
```

Figure 3.7

```
PREP - SCOUT PLATOON - PERSONNEL
 CUMULATIVE MISSION ESSENTIAL TEAMS

                    TM6

01 PLT LDR           1
02 PLT SGT           1
03 GUNNER            2
04 SCOUT             2
05 SCOUT DVR         2
06 SECT LDR          2
07 SQD LDR           2
08 GUNNER            4
09 SCOUT             4
10 SCOUT DVR         4
11 SCOUT             4

TOTAL               28

HIT 'ENTER' OR 'RETURN' TO CONTINUE -
```

Figure 3.8

The cumulative presentation is what is actually stored in computer memory and on disk file. It represents the demands on each line item by team level (unit capability). The "TOTAL" is what was calculated during the display shown earlier at the bottom of Figure 3.3. In Figure 3.9 we are returned to the menu to select 3 "SEE INDIVIDUAL MET".

```
T E R M I N A L   O P T I O N S

 PREP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SEE LINE ITEM TITLES
 2     SEE CUMULATIVE MET
 3     SEE INDIVIDUAL MET
 4     SEE SUBSTITUTABILITY
 5     SEE INIT STR, CDR'S REACT TIME
 6     SEE PROBABILITY DEGRADATION

 7     EDIT OPTIONS
 8     LINEPRINT OPTIONS
 9     FILE AND PROGRAM OPTIONS

10     STOP

ENTER YOUR CHOICE - ?3
```

Figure 3.9

3.6 DISPLAY INDIVIDUAL MET

As in the previous example, it requires two increments to display this data. These are reflected in Figures 3.10 and 3.11.

```
PREP - SCOUT PLATOON - PERSONNEL
 INDIVIDUAL MISSION ESSENTIAL TEAMS

                  TM1   TM2   TM3   TM4   TM5

01 PLT LDR         -     -     -     1     -
02 PLT SGT         -     -     -     -     -
03 GUNNER          -     -     -     1     -
04 SCOUT           -     -     -     1     -
05 SCOUT DVR       -     -     -     1     -
06 SECT LDR        -     1     -     -     1
07 SQD LDR         1     -     1     -     -
08 GUNNER          1     1     1     -     1
09 SCOUT           1     1     1     -     1
10 SCOUT DVR       1     1     1     -     1
11 SCOUT           1     1     1     -     1

TOTAL              5     5     5     4     5

HIT 'ENTER' OR 'RETURN' TO CONTINUE -
```

Figure 3.10

```
PREP - SCOUT PLATOON - PERSONNEL
 INDIVIDUAL MISSION ESSENTIAL TEAMS

                  TM6

01 PLT LDR         -
02 PLT SGT         1
03 GUNNER          1
04 SCOUT           1
05 SCOUT DVR       1
06 SECT LDR        -
07 SQD LDR         -
08 GUNNER          -
09 SCOUT           -
10 SCOUT DVR       -
11 SCOUT           -

TOTAL              4

HIT 'ENTER' OR 'RETURN' TO CONTINUE -
```

Figure 3.11

The reader may have noticed that all menus and displays are headed by "PREP - SCOUT PLATOON - PERSONNEL".

This scheme is presented for all AMORE programs. The First Part is the abbreviated label used to call the resident program ("PREP" for Preprocessor). The middle part is the case label and the last part will be either "PERSONNEL" or "MATERIEL".

The user may change the case label by edit.

The individual MET displayed in Figures 3.10 and 3.11 are incremental requirements at each team level, independent of other team levels. This information corresponds to how the MET data are entered. They are entered or edited by team and by line item. The Preprocessor automatically adjusts the entries to the cumulative demand form required by the Organizational Capability Simulator.

Entering any key returns the menu (Figure 3.12).

```
T E R M I N A L   O P T I O N S

 PREP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO SET

 1     SEE LINE ITEM TITLES
 2     SEE CUMULATIVE MET
 3     SEE INDIVIDUAL MET
 4     SEE SUBSTITUTABILITY
 5     SEE INIT STR, CDR'S REACT TIME
 6     SEE PROBABILITY DEGRADATION

 7     EDIT OPTIONS
 8     LINEPRINT OPTIONS
 9     FILE AND PROGRAM OPTIONS

10     STOP

ENTER YOUR CHOICE - ?4
```

Figure 3.12

3.7 DISPLAY SUBSTITUTABILITY

Entering 4 will display substitutability in three parts, Figures 3.13, 3.14, and 3.15.

PREP - SCOUT PLATOON - PERSONNEL
SUBSTITUTION MATRIX

SKILL	1	2	3	4	5
01 PLT LDR	0	0	-	-	-
02 PLT SGT	15	0	0	-	-
03 GUNNER	-	20	0	0	0
04 SCOUT	-	-	15	0	0
05 SCOUT DVR	-	-	30	15	0
06 SECT LDR	30	15	0	0	-
07 SQD LDR	30	15	0	0	-
08 GUNNER	-	30	0	0	0
09 SCOUT	-	-	15	0	0
10 SCOUT DVR	-	-	15	0	0
11 SCOUT	-	-	30	15	0
SUBSTITUTES	3	5	9	8	6

HIT 'ENTER' OR 'RETURN' TO CONTINUE -

Figure 3.13

PREP - SCOUT PLATOON - PERSONNEL
SUBSTITUTION MATRIX

SKILL	6	7	8	9	10
01 PLT LDR	0	0	-	-	-
02 PLT SGT	0	0	0	-	-
03 GUNNER	15	15	0	0	0
04 SCOUT	30	30	15	0	0
05 SCOUT DVR	-	-	30	15	15
06 SECT LDR	0	0	0	0	0
07 SQD LDR	0	0	0	0	0
08 GUNNER	15	15	0	0	0
09 SCOUT	30	30	15	0	0
10 SCOUT DVR	30	30	30	0	0
11 SCOUT	-	-	30	15	15
SUBSTITUTES	8	8	9	8	8

HIT 'ENTER' OR 'RETURN' TO CONTINUE -

Figure 3.14

PREP - SCOUT PLATOON - PERSONNEL
SUBSTITUTION MATRIX

SKILL	11	TRANS
01 PLT LDR	-	3
02 PLT SGT	-	5
03 GUNNER	0	9
04 SCOUT	0	8
05 SCOUT DVR	0	6
06 SECT LDR	-	8
07 SQD LDR	-	8
08 GUNNER	0	9
09 SCOUT	0	8
10 SCOUT DVR	0	8
11 SCOUT	0	6
SUBSTITUTES	6	78

HIT 'ENTER' OR 'RETURN' TO CONTINUE -

Figure 3.15

In the substitutability displays, non-substitutability is reflected by the symbol "-". The number 1000 is actually stored to represent a sufficiently high penalty to preclude substitution. In the previous MET displays all numbers are shown for the Cummulative case (Figures 3.7 and 3.8) but zeros are suppressed for the Individual case (Figures 3.10 and 3.11).

Figure 3.16 reflects return to the options menu.

```
T E R M I N A L   O P T I O N S

 PREP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO SET

 1     SEE LINE ITEM TITLES
 2     SEE CUMULATIVE MET
 3     SEE INDIVIDUAL MET
 4     SEE SUBSTITUTABILITY
 5     SEE INIT STR, CDR'S REACT TIME
 6     SEE PROBABILITY DEGRADATION

 7     EDIT OPTIONS
 8     LINEPRINT OPTIONS
 9     FILE AND PROGRAM OPTIONS

10     STOP

ENTER YOUR CHOICE - ?5
```

Figure 3.16

3.8 DISPLAY INITIAL STRENGTH, COMMANDER'S REACTION TIMES

A selection of 5 will display initial strength and commanders reaction times.

```
PREP - SCOUT PLATOON - PERSONNEL
 INITIAL STRENGTH, CMDR'S REACTION TIME

ITEM              NUMBER    REACT TIME

01 PLT LDR          1         15
02 PLT SGT          1         10
03 GUNNER           2          5
04 SCOUT            2          2
05 SCOUT DVR        2          2
06 SECT LDR         2         10
07 SQD LDR          2         10
08 GUNNER           7          5
09 SCOUT            4          2
10 SCOUT DVR        4          2
11 SCOUT            4          2

TOTAL
                   31

HIT 'ENTER' OR 'RETURN' TO CONTINUE -
```

Figure 3.17

The initial strength is the number of each line item that resides in the unit prior to degradation. Each of the individual line items will be sampled for every element of its initial strength in the Organizational Capability Simulator.

The commander's reaction time reflects the penalties of decision time. It is a delay time imposed on transfers between line items before substitution or repair penalties begin to count. Line items remaining assigned to their own slot are assessed no decision time penalty.

Entering any key will return the display to the options menu.

```
T E R M I N A L   O P T I O N S

 PREP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO SET

 1     SEE LINE ITEM TITLES
 2     SEE CUMULATIVE MET
 3     SEE INDIVIDUAL MET
 4     SEE SUBSTITUTABILITY
 5     SEE INIT STR, CDR'S REACT TIME
 6     SEE PROBABILITY DEGRADATION

 7     EDIT OPTIONS
 8     LINEPRINT OPTIONS
 9     FILE AND PROGRAM OPTIONS

10     STOP

ENTER YOUR CHOICE - ?6
```

Figure 3.18

3.9 DISPLAY PROBABILITY DEGRADATION

Entering 6 displays the input probability degradations.

```
PREP - SCOUT PLATOON - PERSONNEL
ALL .15 PROBABILITIES

ITEM              PROBABILITY

01 PLT LDR        .15
02 PLT SGT        .15
03 GUNNER         .15
04 SCOUT          .15
05 SCOUT DVR      .15
06 SECT LDR       .15
07 SQD LDR        .15
08 GUNNER         .15
09 SCOUT          .15
10 SCOUT DVR      .15
11 SCOUT          .15

HIT 'ENTER' OR 'RETURN' TO CONTINUE -
```

Figure 3.19

For units larger then 15 line items, the Preprocessor will automatically print 15 at a time because of video screen limits. In contrast, when the line printer is used, all lines will be printed in a continuous sequence. Hitting "RETURN" enables return to the main menu.

```
T E R M I N A L   O P T I O N S

 PREP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SEE LINE ITEM TITLES
 2     SEE CUMULATIVE MET
 3     SEE INDIVIDUAL MET
 4     SEE SUBSTITUTABILITY
 5     SEE INIT STR, CDR'S REACT TIME
 6     SEE PROBABILITY DEGRADATION

 7     EDIT OPTIONS
 8     LINEPRINT OPTIONS
 9     FILE AND PROGRAM OPTIONS

10     STOP

ENTER YOUR CHOICE - ?7
```

Figure 3.20

3.10 INITIATING EDIT OPTIONS

Edit options enable the entry or change of alphabetic or numeric data. This sequence is begun by entering 7.

```
E D I T   O P T I O N S

 PREP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     EDIT LINE ITEM TITLES
 2     EDIT MET (ABSOLUTE)
 3     EDIT MET (RELATIVE)
 4     EDIT SUBSTITUTABILITY
 5     EDIT INITIAL STRENGTH
 6     EDIT PROBABILITIES
 7     EDIT COMMANDER'S REACTION TIMES

 8     CREATE A FILE
 9     CHANGE CASE TITLE

10     OTHER OPTIONS

ENTER YOUR CHOICE - ?1
```

Figure 3.21

Notice that this led to another menu of options. We could return to the main menu at any time by pressing 10 "OTHER OPTIONS".

From this menu we can select all unit data that were displayed in printouts for initial entry or change.

3.11 EDITING LINE ITEM TITLES

Let us first consider Line Item Titles which are initiated by entering 1.

```
EDIT ---> LINE ITEM TITLES

 PREP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SEQUENTIAL PRESENTATION
 2     SELECTIVE PRESENTATION
 3     RETURN

ENTER YOUR CHOICE - ?1
```

Figure 3.22

We chose to look at each line item in sequence. We could have selected a specific line item number. We chose the sequential approach by entering 1.

```
EDIT LINE ITEM TITLES - OPPORTUNITY WILL BE PRESENTED
 SEQUENTIALLY

ENTER LINE ITEM TITLE
      'EX' TO EXIT
      'RETURN' OR 'ENTER' FOR NO CHANGE
ENTRY WILL BE TRUNCATED TO 10 SYMBOLS
 OTHER THAN ADDED LINE NUMBER
     CURRENT ENTRY IS   '01 PLT LDR    '
        YOUR ENTRY IS     1

ENTER LINE ITEM TITLE
      'EX' TO EXIT
      'RETURN' OR 'ENTER' FOR NO CHANGE
ENTRY WILL BE TRUNCATED TO 10 SYMBOLS
 OTHER THAN ADDED LINE NUMBER
     CURRENT ENTRY IS   '02 PLT SGT    '
        YOUR ENTRY IS     2
```

Figure 3.23

These are actually displayed on the screen one set at a time. Suppose we wish to change a title.

```
ENTER LINE ITEM TITLE
      'EX' TO EXIT
      'RETURN' OR 'ENTER' FOR NO CHANGE
ENTRY WILL BE TRUNCATED TO 10 SYMBOLS
 OTHER THAN ADDED LINE NUMBER
      CURRENT ENTRY IS   '05 SCOUT DVR '
         YOUR ENTRY IS     5 AST DRIVER

ENTER LINE ITEM TITLE
      'EX' TO EXIT
      'RETURN' OR 'ENTER' FOR NO CHANGE
ENTRY WILL BE TRUNCATED TO 10 SYMBOLS
 OTHER THAN ADDED LINE NUMBER
      CURRENT ENTRY IS   '06 SECT LDR   '
         YOUR ENTRY IS     6 EX
```

Figure 3.24

In this example line item 5 is "SCOUT DVR" let us change it to "AST DRIVER". Any letters and spaces totaling more then 10 will be cut off to 10. The screen was returned to the edit choices by entering "EX" for exit.

```
E D I T   O P T I O N S

 PREP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     EDIT LINE ITEM TITLES
 2     EDIT MET (ABSOLUTE)
 3     EDIT MET (RELATIVE)
 4     EDIT SUBSTITUTABILITY
 5     EDIT INITIAL STRENGTH
 6     EDIT PROBABILITIES
 7     EDIT COMMANDER'S REACTION TIMES

 8     CREATE A FILE
 9     CHANGE CASE TITLE

10     OTHER OPTIONS

ENTER YOUR CHOICE - ?1
```

Figure 3.25

Select again the line items

```
EDIT ---> LINE ITEM TITLES

 PREP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SEQUENTIAL PRESENTATION
 2     SELECTIVE PRESENTATION
 3     RETURN

ENTER YOUR CHOICE - ?2
```

Figure 3.26

and choose a selective presentation by entering 2.

```
EDIT LINE ITEM TITLES - OPPORTUNITY WILL BE
 PRESENTED SELECTIVELY

ENTER LINE ITEM NUMBER - 5
ENTER LINE ITEM TITLE
      'EX' TO EXIT
      'RETURN' OR 'ENTER' FOR NO CHANGE
ENTRY WILL BE TRUNCATED TO 10 SYMBOLS
 OTHER THAN ADDED LINE NUMBER
      CURRENT ENTRY IS   '05 AST DRIVER'
         YOUR ENTRY IS     5 SCOUT DVR

E D I T   O P T I O N S
```

Figure 3.27

We re-edit line item 5. Notice it reflects our prior editing. Entry returns the screen to Edit Choices.

3.12 EDITING THE MET

There are two ways to edit the MET; absolutely and relatively. We select 2 to get into the absolute mode.

```
 PREP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO SET

 1     EDIT LINE ITEM TITLES
 2     EDIT MET (ABSOLUTE)
 3     EDIT MET (RELATIVE)
 4     EDIT SUBSTITUTABILITY
 5     EDIT INITIAL STRENGTH
 6     EDIT PROBABILITIES
 7     EDIT COMMANDER'S REACTION TIMES

 8     CREATE A FILE
 9     CHANGE CASE TITLE

10     OTHER OPTIONS

ENTER YOUR CHOICE - ?2
```

Figure 3.28

This provides three choices; sequential, selective or return. During sequential presentation, line items are presented one at a time. This is useful for initial entry. The selective mode permits homing in rapidly on small changes to the data base.

```
EDIT ---> MET (ABSOLUTELY)

 PREP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO SET

 1     BY TEAM PRESENTATION
 2     SELECTIVE PRESENTATION
 3     RETURN

ENTER YOUR CHOICE - ?2
```

Figure 3.29

We choose selective presentation by entering 2.

```
OPPORTUNITY TO EDIT MET WILL BE
 BY SELECTED TEAM AND ITEM

ENTER TEAM NUMBER - 5

ENTER LINE NUMBER - 10
ABSOLUTE MET REQUIREMENT FOR TEAM 5
 AND HIGHER
 ENTER 'EX' TO EXIT
       'RETURN' TO LEAVE VALUE UNCHANGED
 CURRENT ENTRY IS 10 SCOUT DVR  '1'
 FOR LINE ITEM NUMBER 10
           YOUR ABSOLUTE ENTRY - 2
```

Figure 3.30

We enter team 5 and line item 10. The display reflects 10 Scout Driver (line item 10) required by team 5. This can be verified by referring back to Figure 3.10. If we wish to increase the number by 1 in the absolute mode we enter 2. 2 replaces 1. This entry returns to the absolute MET edit menu.

```
EDIT ---> MET (ABSOLUTELY)

 PREP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     BY TEAM PRESENTATION
 2     SELECTIVE PRESENTATION
 3     RETURN

ENTER YOUR CHOICE - ?3


PROCESSING
```

Figure 3.31

Entering 3 will return the screen to the main edit menu after totaling the changed MET.

```
E D I T   O P T I O N S

 PREP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     EDIT LINE ITEM TITLES
 2     EDIT MET (ABSOLUTE)
 3     EDIT MET (RELATIVE)
 4     EDIT SUBSTITUTABILITY
 5     EDIT INITIAL STRENGTH
 6     EDIT PROBABILITIES
 7     EDIT COMMANDER'S REACTION TIMES

 8     CREATE A FILE
 9     CHANGE CASE TITLE

10     OTHER OPTIONS

ENTER YOUR CHOICE - ?3
```

Figure 3.32

We will now invoke the relative MET edit option to reverse the change just made. 3 is accordingly entered leading to the display:

```
EDIT ---> MET (RELATIVELY)

 PREP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     BY TEAM PRESENTATION
 2     SELECTIVE PRESENTATION
 3     RETURN

ENTER YOUR CHOICE - ?2
```

Figure 3.33

This choice provides similar options to absolute editing but the application is different.

```
OPPORTUNITY TO EDIT MET WILL BE
 BY SELECTED TEAM AND ITEM

ENTER TEAM NUMBER - 5

ENTER LINE NUMBER - 10
MET REQUIREMENT CHANGE FOR TEAM 5
 AND HIGHER

 ENTER 'EX' TO EXIT
       'RETURN TO LEAVE VALUE UNCHANGED
 CURRENT ENTRY IS 10 SCOUT DVR   '2'
 FOR LINE ITEM NUMBER 10
              YOUR CHANGE ENTRY - -1
```

Figure 3.34

If team 5 and line item 10 are again selected the screen now reflects the requirement for the Scout Driver as 2. To change it back to 1 relatively (referenced to current value), we enter minus one. If we wished to leave the item unchanged we merely press Return. If we wish to exit from this specific editing we enter "EX". This would return to the general editing options.

Entering -1 returns us to options for relative editing of the MET.

```
EDIT ---> MET (RELATIVELY)

 PREP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     BY TEAM PRESENTATION
 2     SELECTIVE PRESENTATION
 3     RETURN

ENTER YOUR CHOICE - ?3


PROCESSING



TOTAL MET REQUIREMENT
 BEING COUNTED BY TEAM
```

Figure 3.35

Entering 3 returns to the general edit options after totaling team requirements.

```
E D I T   O P T I O N S

 PREP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     EDIT LINE ITEM TITLES
 2     EDIT MET (ABSOLUTE)
 3     EDIT MET (RELATIVE)
 4     EDIT SUBSTITUTABILITY
 5     EDIT INITIAL STRENGTH
 6     EDIT PROBABILITIES
 7     EDIT COMMANDER'S REACTION TIMES

 8     CREATE A FILE
 9     CHANGE CASE TITLE

10     OTHER OPTIONS

ENTER YOUR CHOICE - ?9
```

Figure 3.36

3.13 EDITING THE CASE TITLE

Suppose editing changes require us to change the case label (now Scout Platoon) for later audit trail purposes. The title will be carried to all other programs by the data files and will be reflected in results printouts. We enter 9 to get the following option.

```
PREP - SCOUT PLATOON - PERSONNEL

 CURRENT TITLE IS

'SCOUT PLATOON'

IF YOU WISH TO CHANGE IT,
 ENTER 'CHA' - CHA

ENTER NEW CASE TITLE
 SCOUT PLATOON ALT1
```

Figure 3.37

3 specified letters are required to be entered to avoid accidental change. In the illustration (3.37) "SCOUT PLATOON" was changed to "SCOUT PLATOON ALT1". When entered (Return button) we are returned to the general edit menu where the changed title is now reflected in the second line.

```
E D I T   O P T I O N S

 PREP - SCOUT PLATOON ALT1 - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO SET

 1     EDIT LINE ITEM TITLES
 2     EDIT MET (ABSOLUTE)
 3     EDIT MET (RELATIVE)
 4     EDIT SUBSTITUTABILITY
 5     EDIT INITIAL STRENGTH
 6     EDIT PROBABILITIES
 7     EDIT COMMANDER'S REACTION TIMES

 8     CREATE A FILE
 9     CHANGE CASE TITLE

10     OTHER OPTIONS

ENTER YOUR CHOICE - ?4
```

Figure 3.38

3.14 EDITING SUBSTITUTABILITY

By entering 7 in the main menu, we choose the general edit options.

Entering 4 chooses the Substitutability Edit Option.

```
EDIT ---> SUBSTITUTABILITY

 PREP - SCOUT PLATOON ALT1 - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO SET

 1     BY ROW
 2     BY COLUMN
 3     BY COLUMN AND ROW
 4     SELECTED INTERSECTION
 5     COPY ROW
 6     COPY COLUMN
 7     SCREEN ABOVE THRESHOLD
 8     DIAGONALIZE MATRIX
 9     CONVERT INFEASIBLE SUBSTITUTIONS
10     RETURN

ENTER YOUR CHOICE - ?4
```

Figure 3.39

The editing of substitutability presents the most options of any edit routine. The analyst can select a specific row, column or go through the whole substitutability matrix by column then row.

Alternatively he can select a specific row/column intersection. When the matrix is first created, zeros are automatically entered on the diagonal and a penalty of 1000 elsewhere. As he edits the user can accept

these values or override them. Zeros are usually maintained on the diagonal. By selecting 4 we chose a selected intersection edit.

```
EDITING OF SUBSTITUTABILITY WILL BE
 BY SELECTED INTERSECTION

ENTER ROW NUMBER - 4

ENTER COLUMN NUMBER - 5
EDIT SUBSTITUTION PENALTY
 '04 SCOUT' TO '05 SCOUT DVR
ENTER 'EX' TO EXIT
      'RETURN' TO LEAVE VALUE UNCHANGED
 CURRENT PENALTY IS '0'
     YOUR ENTRY IS - 1000
```

Figure 3.40

Assume row 4 and column 5. Note that the screen reflects the line item labels together with the current value (zero in this case). In the example the zero is overriden by 1000 to reflect a scenario where Scouts receive no driver training - that entry returns to the main edit menu.

```
EDIT ---> SUBSTITUTABILITY

 PREP - SCOUT PLATOON ALT1 - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

:NTER TO SET

 1     BY ROW
 2     BY COLUMN
 3     BY COLUMN AND ROW
 4     SELECTED INTERSECTION
 5     COPY ROW
 6     COPY COLUMN
 7     SCREEN ABOVE THRESHOLD
 8     DIAGONALIZE MATRIX
 9     CONVERT INFEASIBLE SUBSTITUTIONS
10     RETURN

ENTER YOUR CHOICE - ??
```

Figure 3.41

Editing by rows or columns allows the sequential format similar to that displayed earlier.

Very often different skills have like capabilities for substitution. This may foster accuracy and economy when building large arrays by allowing the copy of a row or column. This option is self explanatory.

There are three remaining options for substitution edit. Entry 7 can change all penalties above some threshold to a non-substitutability (1000) case. When 7 is entered,

```
THIS ROUTINE WILL ELIMINATE PENALTIES
 ABOVE A SPECIFIED THRESHOLD

HAVE YOU SAVED YOUR ORIGINAL MATRIX ?

IF YOU WISH TO RETURN, ENTER 'R'
 R
EDIT ---> SUBSTITUTABILITY
```

Figure 3.42

The screen prompts the user to consider saving the current matrix (by creating a file) prior to major change. If that has not been done and should be the user can go to the file creation option and save all current values; and subsequently return to this screening option.

To avoid screening he enters R and reverts to the substitutability edit menu.

```
 PREP - SCOUT PLATOON ALT1 - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     BY ROW
 2     BY COLUMN
 3     BY COLUMN AND ROW
 4     SELECTED INTERSECTION
 5     COPY ROW
 6     COPY COLUMN
 7     SCREEN ABOVE THRESHOLD
 8     DIAGONALIZE MATRIX
 9     CONVERT INFEASIBLE SUBSTITUTIONS
10     RETURN

ENTER YOUR CHOICE - ?8
```

Figure 3.43

A diagonalized matrix would reflect cases arising from scenarios where suitable substitutions are not feasible for some reason (e.g., troops in a mine field, under fire). An individual can only fill his own job. This option is set up by entering 8.

```
THIS SECTION IS INTENDED TO PUT ONLY
 ZEROS IN THE DIAGONAL

HAVE YOU SAVED
 YOUR ORIGINAL MATRIX ?

IF YOU WISH TO DIAGONALIZE,
 ENTER 'DIAG' - NO
```

Figure 3.44

The user is prompted for having saved the original data. If he then wished to eliminate all substitutions he enters "DIAG". In the example, this entry reverts the screen back to substitutability options.

```
EDIT ---> SUBSTITUTABILITY

 PREP - SCOUT PLATOON ALT1 - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     BY ROW
 2     BY COLUMN
 3     BY COLUMN AND ROW
 4     SELECTED INTERSECTION
 5     COPY ROW
 6     COPY COLUMN
 7     SCREEN ABOVE THRESHOLD
 8     DIAGONALIZE MATRIX
 9     CONVERT INFEASIBLE SUBSTITUTIONS
10     RETURN

ENTER YOUR CHOICE - ?9
```

Figure 3.45

An entry of 9 selected the option to convert all infeasible substitutions to feasible ones.

```
THIS ROUTINE WILL CONVERT ALL
 INFEASIBLE SUBSTITUTIONS TO
  FEASIBLE ONES

HAVE YOU SAVED YOUR ORIGINAL MATRIX ?

IF YOU WISH TO RETURN, ENTER 'R'


PROCESSING

MAXIMUM CURRENT PENALTY IS 30


 ENTER YOUR THRESHOLD - 35
```

Figure 3.46

We had saved the original matrix and therefore pressed "RETURN". The processing represents a search of the matrix for the highest feasible current time cost. This was 30 and we entered 35 as a higher cost. This technique could be used to discover where substitutions would produce higher capability given the same resources.

```
EDIT ---> SUBSTITUTABILITY

 PREP - SCOUT PLATOON ALT1 - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     BY ROW
 2     BY COLUMN
 3     BY COLUMN AND ROW
 4     SELECTED INTERSECTION
 5     COPY ROW
 6     COPY COLUMN
 7     SCREEN ABOVE THRESHOLD
 8     DIAGONALIZE MATRIX
 9     CONVERT INFEASIBLE SUBSTITUTIONS
10     RETURN

ENTER YOUR CHOICE - ?10


PROCESSING



SUBSTITUTIONS AND TRANSFERS
 NOW BEING COUNTED
```

Figure 3.47

We are returned to the substitutability edit memu. Entering 10 leads to a count of substitutions and transfers and then a return to the edit menu.

```
E D I T   O P T I O N S

 PREP - SCOUT PLATOON ALT1 - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     EDIT LINE ITEM TITLES
 2     EDIT MET (ABSOLUTE)
 3     EDIT MET (RELATIVE)
 4     EDIT SUBSTITUTABILITY
 5     EDIT INITIAL STRENGTH
 6     EDIT PROBABILITIES
 7     EDIT COMMANDER'S REACTION TIMES

 8     CREATE A FILE
 9     CHANGE CASE TITLE

10     OTHER OPTIONS

ENTER YOUR CHOICE - ?10
```

Figure 3.48

An entry of 10 "OTHER OPTIONS" returns to the main menu.

```
T E R M I N A L   O P T I O N S

 PREP - SCOUT PLATOON ALT1 - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SEE LINE ITEM TITLES
 2     SEE CUMULATIVE MET
 3     SEE INDIVIDUAL MET
 4     SEE SUBSTITUTABILITY
 5     SEE INIT STR, CDR'S REACT TIME
 6     SEE PROBABILITY DEGRADATION

 7     EDIT OPTIONS
 8     LINEPRINT OPTIONS
 9     FILE AND PROGRAM OPTIONS

10     STOP

ENTER YOUR CHOICE - ?4
```

Figure 3.49

We have selected 4 to show the current status of substitutability. The conversion of infeasible substitutions shows up in Figures 3.50, 3.51 and 3.52 as a 35 cost.

```
PREP - SCOUT PLATOON ALT1 - PERSONNEL
 SUBSTITUTION MATRIX

   SKILL          1     2     3     4     5

01 PLT LDR        0     0    35    35    35
02 PLT SGT       15     0     0    35    35
03 GUNNER        35    20     0     0     0
04 SCOUT         35    35    15     0    35
05 SCOUT DVR     35    35    30    15     0
06 SECT LDR      30    15     0     0    35
07 SQD LDR       30    15     0     0    35
08 GUNNER        35    30     0     0     0
09 SCOUT         35    35    15     0     0
10 SCOUT DVR     35    35    15     0     0
11 SCOUT         35    35    30    15     0

SUBSTITUTES      10    10    10    10    10

HIT 'ENTER' OR 'RETURN' TO CONTINUE -
```

Figure 3.50

```
PREP - SCOUT PLATOON ALT1 - PERSONNEL
 SUBSTITUTION MATRIX

   SKILL          6     7     8     9    10

01 PLT LDR        0     0    35    35    35
02 PLT SGT        0     0     0    35    35
03 GUNNER        15    15     0     0     0
04 SCOUT         30    30    15     0     0
05 SCOUT DVR     35    35    30    15    15
06 SECT LDR       0     0     0     0     0
07 SQD LDR        0     0     0     0     0
08 GUNNER        15    15     0     0     0
09 SCOUT         30    30    15     0     0
10 SCOUT DVR     30    30    30     0     0
11 SCOUT         35    35    30    15    15

SUBSTITUTES      10    10    10    10    10

HIT 'ENTER' OR 'RETURN' TO CONTINUE -
```

Figure 3.51

```
PREP - SCOUT PLATOON ALT1 - PERSONNEL
 SUBSTITUTION MATRIX

   SKILL         11    TRANS

01 PLT LDR       35       10
02 PLT SGT       35       10
03 GUNNER         0       10
04 SCOUT          0       10
05 SCOUT DVR      0       10
06 SECT LDR      35       10
07 SQD LDR       35       10
08 GUNNER         0       10
09 SCOUT          0       10
10 SCOUT DVR      0       10
11 SCOUT          0       10

SUBSTITUTES      10      110

HIT 'ENTER' OR 'RETURN' TO CONTINUE -
```

Figure 3.52

Hitting "RETURN" reverts to the main menu.

```
T E R M I N A L   O P T I O N S

 PREP - SCOUT PLATOON ALT1 - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SEE LINE ITEM TITLES
 2     SEE CUMULATIVE MET
 3     SEE INDIVIDUAL MET
 4     SEE SUBSTITUTABILITY
 5     SEE INIT STR, CDR'S REACT TIME
 6     SEE PROBABILITY DEGRADATION

 7     EDIT OPTIONS
 8     LINEPRINT OPTIONS
 9     FILE AND PROGRAM OPTIONS

10     STOP

ENTER YOUR CHOICE - ?9
```

Figure 3.53

3.15 FILE AND PROGRAM OPTIONS

We have now selected this option by entering 9.

```
F I L E / P R O G R A M   O P T I O N S

 PREP - SCOUT PLATOON ALT1 - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     CREATE OR DELETE FILES
 2     PROGRAM SAVING
 3     LINEPRINT
 4     RUN ORG CAP SIMULATOR
 5     RUN TIME CAP SIMULATOR
 6     OTHER OPTIONS

ENTER YOUR CHOICE - ?1
```

Figure 3.54

This permits us to create files, save programs, go to line printing or running two of the other AMORE programs. Let us consider creating a file. Enter 1 to get:

```
PREP - SCOUT PLATOON ALT1 - PERSONNEL

ENTER DATA FILE NAME - SCOUTP1

IF YOU WISH TO DELETE A FILE
 WITH THE SAME NAME, ENTER 'D' -


IF YOU ALSO WISH TO CREATE THE FILE,
 ENTER 'C' - C

CREATING SCOUTP1,D1

IF YOU WISH TO BACKUP,
 ENTER 'B' -
```

Figure 3.55

The screen asks for the name for the new (or old file). Consider this file an alternate of the Scout Platoon to be labeled SCOUTP1.

Since this file does not yet exist we do not enter D. C is entered to create the file. The file will be created on disk drive 1 (D1). For systems with two or more disk drives exercise of a backup option will also create the file on a disk in drive 2. If the system has a single drive and the analyst wishes to backup his file he can rerun this option. In our case we bypassed the backup option and were returned to the File/Program options menu.

```
F I L E / P R O G R A M   O P T I O N S

 PREP - SCOUT PLATOON ALT1 - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     CREATE OR DELETE FILES
 2     PROGRAM SAVING
 3     LINEPRINT
 4     RUN ORG CAP SIMULATOR
 5     RUN TIME CAP SIMULATOR
 6     OTHER OPTIONS

ENTER YOUR CHOICE - ?1
```

Figure 3.56

We now select 1 to show the steps if the file name already exists and is to be "written over".

```
PREP - SCOUT PLATOON ALT1 - PERSONNEL

ENTER DATA FILE NAME - SCOUTP1

IF YOU WISH TO DELETE A FILE
 WITH THE SAME NAME, ENTER 'D' - D

IF THE FILE IS NOW LOCKED,
 ENTER 'L' - L

IF YOU ALSO WISH TO CREATE THE FILE,
 ENTER 'C' - C

UNLOCKING SCOUTP1,D1
DELETING SCOUTP1,D1
CREATING SCOUTP1,D1

IF YOU WISH TO BACKUP,
 ENTER 'B' -
```

Figure 3.57

Following the preprocessing we are again returned to the File/Program Options Menu.

```
F I L E / P R O G R A M   O P T I O N S

 PREP - SCOUT PLATOON ALT1 - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     CREATE OR DELETE FILES
 2     PROGRAM SAVING
 3     LINEPRINT
 4     RUN ORG CAP SIMULATOR
 5     RUN TIME CAP SIMULATOR
 6     OTHER OPTIONS

ENTER YOUR CHOICE - ?2
```

Figure 3.58

This time we select 2 to get.

```
F I L E / P R O G R A M   O P T I O N S

 PREP - SCOUT PLATOON ALT1 - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     CATALOG,D1
 2     CATALOG,D2

 3     UNLOCK, SAVE, LOCK PREP,D1
 4     UNLOCK, SAVE, LOCK PREP,D2

 5     OTHER OPTIONS


ENTER YOUR CHOICE - ?1
```

Figure 3.59

We entered 1 to get a display at all files on the disk in D1.

```
DISK VOLUME 001

*A 006 AMORE
*B 009 AMORE/ASM.OBJ0
*B 002 ARRAY PASS.OBJ0
*A 097 PREP
*A 057 ORGCAP
*A 062 TIMCAP
*A 044 CORCAP
*T 011 ORGMAT
*A 080 SURLIN
*T 005 SCOUTP
*T 005 SCOUTM
*T 005 SCOUTP1

HIT 'ENTER' OR 'RETURN' TO CONTINUE -
```

Figure 3.60

Note the last item is the file just created. (It won't always be the last item since the Disk Operating System automatically manages disk space).

3.16 MATERIEL FILES AND OTHER EDIT FEATURES

We now return to examine other edit alternatives and to illustrate also some differences between personnel and materiel file formats. Returning to the "RUN" stage:

```
A M O R E

P R E P R O C E S S O R

IF YOU WISH TO READ IN A DATA FILE,
 ENTER THE WORD
  'F' 'I' 'L' 'E' - FILE

ENTER DATA FILE NAME - SCOUTM
READING IN SCOUT PLATOON - MATERIEL
TOTAL MET REQUIREMENT
 BEING COUNTED BY TEAM
```

Figure 3.61

The SCOUTM file was entered and contains the materiel data for the Scout Platoon. The successful read in leads to the main menu.

```
T E R M I N A L   O P T I O N S

 PREP - SCOUT PLATOON - MATERIEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SEE LINE ITEM TITLES
 2     SEE CUMULATIVE MET
 3     SEE INDIVIDUAL MET
 4     SEE SUBSTITUTABILITY
 5     SEE INIT STR, CDR'S REACT TIME
 6     SEE PROB DEG, REP TIMES

 7     EDIT OPTIONS
 8     LINEPRINT OPTIONS
 9     FILE AND PROGRAM OPTIONS

10     STOP

ENTER YOUR CHOICE - ?7
```

Figure 3.62

There are two differences between this menu and the one for personnel data (Figure 3.4 at the beginning of this chapter.

First the title has "MATERIEL" instead of "PERSONNEL". This is an automatic format feature.

Second selection of option 6 will display repair times in addition to probability degradations. We chose 7 to get to the "EDIT OPTIONS".

```
E D I T   O P T I O N S

 PREP - SCOUT PLATOON - MATERIEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     EDIT LINE ITEM TITLES
 2     EDIT MET (ABSOLUTE)
 3     EDIT MET (RELATIVE)
 4     EDIT SUBSTITUTABILITY
 5     EDIT INITIAL STRENGTH
 6     EDIT PROBABILITIES
 7     EDIT COMMANDER'S REACTION TIMES

 8     EDIT REPAIR TIMES

 9     CREATE A FILE
10     CHANGE CASE TITLE

11     OTHER OPTIONS

ENTER YOUR CHOICE - ?5
```

Figure 3.63

The edit menu has also been automatically amended to add entry 8 "EDIT REPAIR TIMES". We will see later how the user originates either a personnel or materiel format. The edit of initial strength is selected.

```
EDIT ---> INITIAL STRENGTH

 PREP - SCOUT PLATOON - MATERIEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SEQUENTIAL PRESENTATION
 2     SELECTIVE PRESENTATION
 3     RETURN

ENTER YOUR CHOICE - ?2
```

Figure 3.64

A sequential presentation presents each materiel item in turn for entry, overwide, or acceptance. The format is the same as that for "SELECTIVE PRESENTATION".

```
EDIT INITIAL STRENGTH - OPPORTUNITY
 WILL BE PRESENTED SELECTIVELY

ENTER LINE ITEM NUMBER - 5
EDIT INITIAL STRENGTH
 ENTER 'EX' TO EXIT
       'RETURN' TO LEAVE VALUE UNCHANGED
 CURRENT LINE ITEM STRENGTH IS
 05 AN/VRC-160 '2'
 YOUR ENTRY - 3
```

Figure 3.65

We selected materiel item 5; an AN/VRC-160. There were 2 in the original SCOUTM file. It is here updated to 3. We select line item 8 for examination and accept the 2 IM-174 by entering "RETURN".

```
ENTER LINE ITEM NUMBER - 8
EDIT INITIAL STRENGTH
 ENTER 'EX' TO EXIT
       'RETURN' TO LEAVE VALUE UNCHANGED
 CURRENT LINE ITEM STRENGTH IS
 08 IM-174 '2'
 YOUR ENTRY -
```

Figure 3.66

This returns us to the Edit Menu.

```
E D I T   O P T I O N S

 PREP - SCOUT PLATOON - MATERIEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     EDIT LINE ITEM TITLES
 2     EDIT MET (ABSOLUTE)
 3     EDIT MET (RELATIVE)
 4     EDIT SUBSTITUTABILITY
 5     EDIT INITIAL STRENGTH
 6     EDIT PROBABILITIES
 7     EDIT COMMANDER'S REACTION TIMES

 8     EDIT REPAIR TIMES

 9     CREATE A FILE
10     CHANGE CASE TITLE

11     OTHER OPTIONS

ENTER YOUR CHOICE - ?6
```

Figure 3.67

The editing of probabilities was chosen leading to a probability edit menu.

```
EDIT ---> PROBABILITIES

 PREP - SCOUT PLATOON - MATERIEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SEQUENTIAL PRESENTATION
 2     SELECTIVE PRESENTATION
 3     BLANKET ENTRY
 4     RETURN

ENTER YOUR CHOICE - ?1
```

Figure 3.68

We initially choose sequential editing and get a sequence for "SEVERE", "MODERATE", and "LIGHT" Damage probabilities.

```
EDIT INDIVIDUAL PROBABILITIES
SEQUENTIALLY

HIT 'ENTER' OR 'RETURN' TO CONTINUE -

EDIT INDIVIDUAL PROBABILITY
 ENTER 'EX' TO EXIT
       'RETURN' TO LEAVE VALUE UNCHANGED
 CURRENT SEVERE PROBABILITY IS
 01 CHEM ALARM '.05'
 YOUR ENTRY -

EDIT INDIVIDUAL PROBABILITY
 ENTER 'EX' TO EXIT
       'RETURN' TO LEAVE VALUE UNCHANGED
 CURRENT MODERATE PROBABILITY IS
 01 CHEM ALARM '.1'
 YOUR ENTRY - .13

EDIT INDIVIDUAL PROBABILITY
 ENTER 'EX' TO EXIT
       'RETURN' TO LEAVE VALUE UNCHANGED
 CURRENT LIGHT PROBABILITY IS
 01 CHEM ALARM '.2'
 YOUR ENTRY - EX
```

Figure 3.69

These probabilities are presented and stored cummulatively. The probability of severe damage is just that; the chances for the item being severely damaged. But the probability for moderate damage is the probability of <u>at least</u> moderate damage to include severe. If the respective probabilities for severe and moderate damage are .05 and .1 then the probability of moderate but not severe is .1 minus .05 or .05. The entry for moderate must be greater or equal to that for severe. The entry for light damage, likewise must exceed or equal that for moderate. Finally the probability for severe cannot be negative and the probability entered for light damage (at least light to include moderate and severe) cannot exceed 1.

In our example we accepted the .05 for severe but changed the .1 entry of moderate to .13. .13 is the probability of at least moderate damage. Implicitly .08 is the probability of moderate-only damage. We

decided to accept the .2 probability of at least light damage. We could have accomplished that by pressing "RETURN" and continuing the sequence. We chose to exit by entering "EX". This returned the display to the Edit Menu.

```
E D I T   O P T I O N S

 PREP - SCOUT PLATOON - MATERIEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     EDIT LINE ITEM TITLES
 2     EDIT MET (ABSOLUTE)
 3     EDIT MET (RELATIVE)
 4     EDIT SUBSTITUTABILITY
 5     EDIT INITIAL STRENGTH
 6     EDIT PROBABILITIES
 7     EDIT COMMANDER'S REACTION TIMES

 8     EDIT REPAIR TIMES

 9     CREATE A FILE
10     CHANGE CASE TITLE

11     OTHER OPTIONS

ENTER YOUR CHOICE - ?6
```

Figure 3.70

We select 3 to demonstrate a unique entry feature for probabilities; the blanket entry.

```
EDIT ---> PROBABILITIES

 PREP - SCOUT PLATOON - MATERIEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SEQUENTIAL PRESENTATION
 2     SELECTIVE PRESENTATION
 3     BLANKET ENTRY
 4     RETURN

ENTER YOUR CHOICE - ?3
```

Figure 3.71

This presents in turn prompts for "SEVERE", MODERATE", and "LIGHT" damage.

```
A SINGLE PROBABILITY WILL BE ENTERED
 FOR SEVERE, MODERATE, AND LIGHT
 ENTER 'RETURN' TO LEAVE ALL UNCHANGED

 YOUR SEVERE ENTRY - .05
 YOUR MODERATE ENTRY - .15
 YOUR LIGHT ENTRY - .23
```

Figure 3.72

The original SCOUTM file contained blanket .05, .1 and .2 for entries we here changed them to .05, .15, and .23. The blanket entry now places these values for every line item probability and then returns the display to the edit menu.

```
E D I T   O P T I O N S

 PREP - SCOUT PLATOON - MATERIEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     EDIT LINE ITEM TITLES
 2     EDIT MET (ABSOLUTE)
 3     EDIT MET (RELATIVE)
 4     EDIT SUBSTITUTABILITY
 5     EDIT INITIAL STRENGTH
 6     EDIT PROBABILITIES
 7     EDIT COMMANDER'S REACTION TIMES

 8     EDIT REPAIR TIMES

 9     CREATE A FILE
10     CHANGE CASE TITLE

11     OTHER OPTIONS

ENTER YOUR CHOICE - ?11
```

Figure 3.73

The editing of Commander's reaction times, and repair times follows a format similar to that for Initial Strength editing. We return to the main menu.

```
T E R M I N A L   O P T I O N S

 PREP - SCOUT PLATOON - MATERIEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SEE LINE ITEM TITLES
 2     SEE CUMULATIVE MET
 3     SEE INDIVIDUAL MET
 4     SEE SUBSTITUTABILITY
 5     SEE INIT STR, CDR'S REACT TIME
 6     SEE PROB DEG, REP TIMES

 7     EDIT OPTIONS
 8     LINEPRINT OPTIONS
 9     FILE AND PROGRAM OPTIONS

10     STOP

ENTER YOUR CHOICE - ?6
```

Figure 3.74

Next we display probability degradation and repair times in Figures 3.75 and 3.76.

Notice that the title contains the label "ALL .05/.15/.13 PROBABILITIES". This label is automatically developed and will become part of the file to be carried to the Organizational Capability Simulator. If all probabilities are not the same the phrase "MIXED PROBABILITIES" would appear instead.

Repair times shown are the expected times of return for each item. The system can accept times up to 998 minutes; any combined penalties equalling 999 or greater are treated as unrepairable.

3.17 SETTING UP PERSONNEL OR MATERIEL FORMATS

We can terminate a program by one of the inherent "STOP" options on one of the menus. Alternatively on Apple computers, pressing simultaneously "CONTROL" and "C" will stop execution of any basic program. If the program is in a prompt phase simultaneous "CONTROL" and "C" followed by "RETURN" will return the display to user control. The program will still be in computer memory.

A reminder may be useful that any editing changes only inpact on computer memory. The user must create or write over a disk file to make them permanent. The above stopping actions did not erase any computer data. The user could return to the program by entering "GOTO 400". Alternatively he can type "RUN" to initialize and run a fresh "PREP" processing program. This erases all data and starts the initial dialog.

PREP - SCOUT PLATOON - MATERIEL
ALL .05/.15/.23 PROBABILITIES

ITEM	SEV	MOD	LIGHT
01 CHEM ALARM	.05	.15	.23
02 CFV M3	.05	.15	.23
03 IM-74	.05	.15	.23
04 AN/VRC-46	.05	.15	.23
05 AN/VRC-160	.05	.15	.23
06 CHEM ALARM	.05	.15	.23
07 CFV M3	.05	.15	.23
08 IM-174	.05	.15	.23
09 AN/VRC-46	.05	.15	.23
10 AN/GRC-160	.05	.15	.23

HIT 'ENTER' OR 'RETURN' TO CONTINUE -

Figure 3.75

PREP - SCOUT PLATOON - MATERIEL
REPAIR TIMES

ITEM	MODERATE	LIGHT
01 CHEM ALARM	240	20
02 CFV M3	240	20
03 IM-74	240	20
04 AN/VRC-46	240	20
05 AN/VRC-160	240	20
06 CHEM ALARM	240	20
07 CFV M3	240	20
08 IM-174	240	20
09 AN/VRC-46	240	20
10 AN/GRC-160	240	20

HIT 'ENTER' OR 'RETURN' TO CONTINUE -

Figure 3.76

```
RUN
                    A M O R E

              P R E P R O C E S S O R

IF YOU WISH TO READ IN A DATA FILE,
 ENTER THE WORD
   'F' 'I' 'L' 'E' -
CREATE A NEW DATA FILE

IF 'PERSONNEL', ENTER 'P'
 IF 'MATERIEL', ENTER 'M'
                              P
ENTER THE UNIT TITLE - MECH COMPANY
PREP - MECH COMPANY - PERSONNEL
ENTER NUMBER OF LINE ITEMS - 32
ENTER THE MAXIMUM NUMBER OF TEAMS - 18
```

Figure 3.77

Before we showed results of typing in "FILE" and then the file name "SCOUTP " or "SCOUTM". Here we didn't enter file and were prompted for personnel or materiel. Entering a "P" automatically formats for personnel and an "M" formats for materiel. Additionally we are prompted for the number of line items and the number of teams. These entries establish the proper dimensioning of all arrays and will be carried automatically through all files. The user may now enter his initial data and at any time interrupt to create or update a file. The entry of team numbers returns to the main menu.

```
T E R M I N A L   O P T I O N S

 PREP - MECH COMPANY - PERSONNEL

    SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SEE LINE ITEM TITLES
 2     SEE CUMULATIVE MET
 3     SEE INDIVIDUAL MET
 4     SEE SUBSTITUTABILITY
 5     SEE INIT STR, CDR'S REACT TIME
 6     SEE PROBABILITY DEGRADATION

 7     EDIT OPTIONS
 8     LINEPRINT OPTIONS
 9     FILE AND PROGRAM OPTIONS

10     STOP

ENTER YOUR CHOICE - ?10
```

Figure 3.78

There is a redimensioning option which will be covered in Chapter 7. This permits the user to reduce, combine, or add line items or teams.

CHAPTER 4
OPERATING THE ORGANIZATIONAL CAPABILITY SIMULATOR

4.0 OVERVIEW

This chapter will present a walk through the Organizational Capability Simulator in the fashion of Chapter 3.

There is a separate Organizational Capability Simulator version for personnel and materiel data files. In this manual we have adopted the convention of adding a P at the end of the baseline personnel data files and an M for materiel files. The first letters of the file name are suggestive of the unit of origin. Accordingly SCOUTP represents Scout Platoon Personnel Data.

The purpose of the Organizational Capability Simulator is to sample the initial strength of the organization of interest with the input degradation probabilities. The simulator then transforms these survivors into capability distributions, expected assignments, expected assignment penalties and line item needs and surplusses.

4.1 STARTING UP

There are a number of ways to initiate the run sequence. The simulator may be run directly from the Preprocessor by selecting the option from the File and Program Options menu.

It can be run directly by typing and entering "RUN ORGCAP" for personnel or "LOAD ORGCAP" followed by "EXEC ORGMAT" followed by "RUN" for materiel. (More on material later).

Alternatively the analyst can type "RUN AMORE" or just turn the computer on with a Volume 1 AMORE disk in disk drive 1. We assume the latter option and the following appears.

```
W E L C O M E

T O  T H E

A M O R E

M O D E L  S Y S T E M

25 OCTOBER 1983

SPONSORED BY

THE ARMY RESEARCH INSTITUTE
```

Figure 4.1

This is also similar to the procedure used to start the Preprocessor. It may also be used to run the Time Capability Simulator. After a few moments, the next display is:

```
R U N  O P T I O N S

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1    PREPROCESSOR

 2    ORGANIZATIONAL CAPABILITY

 3    TIME CAPABILITY

 4    CAPABILITY COORDINATION

 5    SURVIVABILITY LINKAGE

 6    STOP

ENTER YOUR CHOICE - 2
```

Figure 4.2

In this case, we enter 2, and after some processing (while Figure 4.1 again appears) the first part of Figure 4.3 appears.

4.2 ENTERING A PERSONNEL DATA BASE

```
O R G A N I Z A T I O N A L

C A P A B I L I T Y

S I M U L A T O R

P E R S O N N E L


ENTER DATA FILE NAME
 SCOUTP

READING IN SCOUT PLATOON - PERSONNEL
 DATA

HOW MANY REPLICATIONS -
 (MAXIMUM FOR DIMENSIONING PURPOSES)?
 6
```

Figure 4.3

The user is first asked for a file name. Unlike the Preprocessor, this simulator cannot be operated without an appropriate file. This procedure was chosen to assure proper format matching.

We input SCOUTP. After some processing, the statement READING IN SCOUT PLATOON - PERSONNEL DATA" appears.

After further processing we are asked for a number of replications. This is used to size tables and should be equal to or larger than any number of replications we anticipate using. We will not be able to run more replications than this number except by restarting the run to include reading in the file again.

We chose 6 and the display changed to:

```
SOLUTION RESULT SCREEN PRINTS

 ORGCAP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     PROGRAM AND FILE OPTIONS
 2     SOLVE

ENTER YOUR CHOICE - ?2
```

Figure 4.4

We will explore entry 1 later.

The user should get permanent line prints of the Initial Strength, Mission Essential Teams, Substituability and other inputs at the Preprocessor stage and have them at hand for this and other AMORE processing.

4.3 INITIATING THE SOLUTION

In this case we initiate the simulation, by entering 2 to get the following display:

```
DEGRADATION PROBABILITIES ARE
 NOW ALL .15

IF YOU WISH TO ENTER
 A UNIVERSAL DEGRADATION PROBABILITY,
 ENTER 'UNP' -

DEGRADATION PROBABILITIES ARE
 NOW ALL .15

THERE ARE 6 TEAMS
 ENTER GOAL TEAM LEVEL - 5

HOW MANY REPLICATIONS - 6
```

Figure 4.5

The prompt message reminds us of the sampling probabilities residing in computer memory (from the SCOUTP file entered at the start).

The next prompt permits changing the probabilities universally. (I.e., all line item degradation probabilities may be changed to the same value. Individual line item degradation probabilities may be entered only by way of the Preprocessor.)

In this example we bypass the universal probability option. Had we entered new probabilities (other than .15) the label "ALL .15" would have been changed.

We are asked next for a Goal Team Level. The capability distribution will be compared with this value for a measure of outcome success. The entry of 5 (teams) now changes the display.

4.4 SURVIVOR FILES

```
IF YOU WISH TO CALL A SURVIVOR FILE,
 ENTER 'CAL' - CAL

ENTER SURVIVOR FILE NAME - SAMSCOP6

READING IN SCOUT PLATOON - PERSONNEL
 SURVIVOR DATA
REPLICATION 1    TEAM 6
```

Figure 4.6

We are presented with an option of entering a survivor file. If we do not enter "CAL" the simulator will automatically sample for survivors and then present us with the option of saving the results on a file which could be reentered as often as we please. We elected to enter a survivor file and were prompted for its name. For survivor baseline files we use the convention of the first three letters "SAM" (for sample) and the next three letters are the first three letters of the unit data file used. Finally we add a P or M* for personnel or materiel and a number for the number of replications. In this case, we had previously created the survivor file SAMSCOP6 and enter the name now. The file-read process is indicated by an appropriate message. Shortly thereafter the further message "REPLICATION 1 TEAM 6" appears. This means that the simulator is testing whether team 6 can be built with the survivors of replication 1. The display gives way to Figure 4.7.

* The user need not adopt the convention of adding "P" or "M". The personnel or materiel formats are established automatically and are independent of file title.

4.5 CAPABILITY CALCULATION DISPLAYS

```
GOAL 5 TEAMS - DEG PROB ALL .15
1 REPLICATIONS OF 1 SUCCEEDED
LAST MAXIMUM PENALTY: 5

TEAMS BUILT
  1      0
  2      0
  3      0
  4      0
  5      0
  6      1


REPLICATION 2    TEAM 6
```

Figure 4.7

This display shows the Goal Team Level, a description of the degradation probabilities; how many successful (i.e., achieved at least the goal of 5 teams) replications have thus far occurred out of how many total. There may be several attempts to match a team level starting with the highest numerical possibility.

In addition to success information, an indication of the cost is reflected (last maximum penalty was 5).

Figures 4.8, 4.9, 4.10, 4.11 and 4.12 display the remaining replication results.

```
GOAL 5 TEAMS - DEG PROB ALL .15
2 REPLICATIONS OF 2 SUCCEEDED
LAST MAXIMUM PENALTY: 20

TEAMS BUILT
  1      0
  2      0
  3      0
  4      0
  5      0
  6      2


REPLICATION 3    TEAM 6
REPLICATION 3    TEAM 5
```

Figure 4.8

```
GOAL 5 TEAMS - DEG PROB ALL .15
3 REPLICATIONS OF 3 SUCCEEDED
LAST MAXIMUM PENALTY: 10

TEAMS BUILT
  1      0
  2      0
  3      0
  4      0
  5      1
  6      2


REPLICATION 4    TEAM 6
REPLICATION 4    TEAM 5
```

Figure 4.9

```
GOAL 5 TEAMS - DEG PROB ALL .15
4 REPLICATIONS OF 4 SUCCEEDED
LAST MAXIMUM PENALTY: 5

TEAMS BUILT
  1      0
  2      0
  3      0
  4      0
  5      2
  6      2


REPLICATION 5    TEAM 6
REPLICATION 5    TEAM 5
REPLICATION 5    TEAM 4
```

Figure 4.10

```
GOAL 5 TEAMS - DEG PROB ALL .15
4 REPLICATIONS OF 5 SUCCEEDED
LAST MAXIMUM PENALTY: 40

TEAMS BUILT
  1      0
  2      0
  3      0
  4      1
  5      2
  6      2


REPLICATION 6    TEAM 6
REPLICATION 6    TEAM 5
REPLICATION 6    TEAM 4
```

Figure 4.11

```
GOAL 5 TEAMS - DEG PROB ALL .15
4 REPLICATIONS OF 6 SUCCEEDED
LAST MAXIMUM PENALTY: 10

TEAMS BUILT
  1      0
  2      0
  3      0
  4      2
  5      2
  6      2
```

Figure 4.12

Notice that in Figures 4.10 and 4.11 the simulation had bypassed teams 5 and 6 immediately. There were insufficient survivors (numerically) to meet the total of either team five or six MET requirements.

Since these replications could all build to the level which was numerically possible with the given survivor sets, the indication is that the Scout Platoon is population limited (not skill limited) with regard to personnel.

The displays ultimate give way to Figure 4.13.

4.6 CAPABILITY FILES

```
IF YOU WISH TO SAVE A CAPABILITY FILE
 ENTER 'CAP'CAP
```

Figure 4.13

The user is given the option of saving a capability file associated with this run for further processing in the Time Capability Simulator. We exercised this option by entering "CAP" and processed it according to Figure 4.14.

```
SIZING ARRAY
ENTER CAPABILITY FILE NAME
 CAPSCOP6

IF YOU WISH TO DELETE A FILE
 WITH THE SAME NAME, ENTER 'D' -

IF YOU WISH TO CREATE THE FILE,
 ENTER 'C' - C
CREATING CAPSCOP6,D1

IF YOU WISH TO BACK UP,
ENTER 'B' -
```

Figure 4.14

A back up option was not exercised and the display changed to Figure 4.15.

4.7 POST CAPABILITY ANALYSIS DISPLAYS

```
SOLUTION RESULT SCREEN PRINTS

 ORGCAP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     PROGRAM AND FILE OPTIONS
 2     SOLVE

 3     LINEPRINT
 4     OPTIMAL SUMMARY
 5     ASSIGNMENT DATA
 6     EXPECTED ASSIGNMENT PENALTIES

 7     NEEDS AND SURPLUS CALCULATIONS

ENTER YOUR CHOICE - ?4
```

Figure 4.15

We have returned to the main menu. But options 3 through 7 have been added based on the completed simulation. We now exercise each of these options. First we choose "OPTIMAL SUMMARY" by entering 7 resulting in Figure 4.16.

```
GOAL 5 TEAMS - DEG PROB ALL .15
4 REPLICATIONS OF 6 SUCCEEDED
LAST MAXIMUM PENALTY: 10

TEAMS BUILT
  1     0
  2     0
  3     0
  4     2
  5     2
  6     2


HIT 'RETURN' TO CONTINUE -
```

Figure 4.16

If the analyst compares Figure 4.16 with Figure 4.12, they will be the same and the Optimal Summary is the final result. It may also be line printed. To remove it from the screen we hit the return key and revert to the main menu.

```
SOLUTION RESULT SCREEN PRINTS

 ORGCAP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     PROGRAM AND FILE OPTIONS
 2     SOLVE

 3     LINEPRINT
 4     OPTIMAL SUMMARY
 5     ASSIGNMENT DATA
 6     EXPECTED ASSIGNMENT PENALTIES

 7     NEEDS AND SURPLUS CALCULATIONS

ENTER YOUR CHOICE - ?5
```

Figure 4.17

We now select 5 and get in succession the displays in Figures 4.18, 4.19 and 4.20.

```
ORGCAP - SCOUT PLATOON - PERSONNEL
 AVERAGE ASGMTS - UNUSED FEASIBILITY

   SKILL          1     2     3     4     5

01 PLT LDR       .8    F     -     -     -
02 PLT SGT       F     .3    F     -     -
03 GUNNER        -     F     1.3   F     F
04 SCOUT         -     -     F     1.2   F
05 SCOUT DVR     -     -     F     F     1.3
06 SECT LDR      .2    F     F     F     -
07 SQD LDR       F     F     F     F     -
08 GUNNER        -     F     F     .2    F
09 SCOUT         -     -     F     F     F
10 SCOUT DVR     -     -     F     F     F
11 SCOUT         -     -     F     F     F

HIT 'RETURN' TO CONTINUE -
```

Figure 4.18

```
ORGCAP - SCOUT PLATOON - PERSONNEL
 AVERAGE ASGMTS - UNUSED FEASIBILITY

   SKILL          6     7     8     9     10

01 PLT LDR       F     F     -     -     -
02 PLT SGT       F     .2    F     -     -
03 GUNNER        F     F     .2    F     F
04 SCOUT         F     F     F     F     .2
05 SCOUT DVR     -     -     F     F     F
06 SECT LDR      1.3   .2    F     F     F
07 SQD LDR       F     1.5   F     F     F
08 GUNNER        .3    .2    3.5   .2    F
09 SCOUT         F     F     F     3.5   F
10 SCOUT DVR     F     F     F     F     3.5
11 SCOUT         -     -     F     F     F

HIT 'RETURN' TO CONTINUE -
```

Figure 4.19

```
ORGCAP - SCOUT PLATOON - PERSONNEL
 AVERAGE ASGMTS - UNUSED FEASIBILITY

   SKILL       11

01 PLT LDR      -
02 PLT SGT      -
03 GUNNER       F
04 SCOUT        F
05 SCOUT DVR    .5
06 SECT LDR     -
07 SQD LDR      -
08 GUNNER       .3
09 SCOUT        F
10 SCOUT DVR    F
11 SCOUT       2.8

HIT 'RETURN' TO CONTINUE -
```

Figure 4.20

These displays reflect assignment trends. They are calculated as follows. In each replication, every time an assignment is made it is added to this table. After the final replication, each entry is divided by the number of replications (six in this case). The display shows average assignments other than zero rounded to the nearest 10th. The "F"s indicate assignment feasibility not used. If the user compares Figures 4.18-4.20 with the substitutability printouts, he will see that the "F" represents feasible substitutability. If any assignments are made during any replication, the "F"s are replaced by numbers as in the foregoing displays.

Consider column 1 in Figure 4.18 for five replications the platoon leader could fill his own job; in one replication he becomes a casualty and the squad leader substituted. Five sixths is .8333 or .8 rounded; one sixth is .1667 or .2 rounded.

We return to the main menu in Figure 4.21.

```
SOLUTION RESULT SCREEN PRINTS

 ORGCAP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     PROGRAM AND FILE OPTIONS
 2     SOLVE

 3     LINEPRINT
 4     OPTIMAL SUMMARY
 5     ASSIGNMENT DATA
 6     EXPECTED ASSIGNMENT PENALTIES

 7     NEEDS AND SURPLUS CALCULATIONS

ENTER YOUR CHOICE - ?6
```

Figure 4.21

We enter 6 to get the next sequence Figures 4.22, 4.23 and 4.24.

```
ORGCAP - SCOUT PLATOON - PERSONNEL
 EXPECTED ASSIGNMENT PENALTIES

    SKILL          1     2     3     4     5

01 PLT LDR         -     -     -     -     -
02 PLT SGT         -     -     -     -     -
03 GUNNER          -     -     -     -     -
04 SCOUT           -     -     -     -     -
05 SCOUT DVR       -     -     -     -     -
06 SECT LDR     6.67     -     -     -     -
07 SQD LDR         -     -     -     -     -
08 GUNNER          -     -     -    .83    -
09 SCOUT           -     -     -     -     -
10 SCOUT DVR       -     -     -     -     -
11 SCOUT           -     -     -     -     -


 HIT 'RETURN' TO CONTINUE -
```

Figure 4.22

ORGCAP - SCOUT PLATOON - PERSONNEL
EXPECTED ASSIGNMENT PENALTIES

SKILL	6	7	8	9	10
01 PLT LDR	-	-	-	-	-
02 PLT SGT	-	1.67	-	-	-
03 GUNNER	-	-	.83	-	-
04 SCOUT	-	-	-	-	.33
05 SCOUT DVR	-	-	-	-	-
06 SECT LDR	-	1.67	-	-	-
07 SQD LDR	-	-	-	-	-
08 GUNNER	6.67	3.33	-	.83	-
09 SCOUT	-	-	-	-	-
10 SCOUT DVR	-	-	-	-	-
11 SCOUT	-	-	-	-	-

HIT 'RETURN' TO CONTINUE -

Figure 4.23

ORGCAP - SCOUT PLATOON - PERSONNEL
EXPECTED ASSIGNMENT PENALTIES

SKILL	11
01 PLT LDR	-
02 PLT SGT	-
03 GUNNER	-
04 SCOUT	-
05 SCOUT DVR	1.0
06 SECT LDR	-
07 SQD LDR	-
08 GUNNER	1.67
09 SCOUT	-
10 SCOUT DVR	-
11 SCOUT	-

HIT 'RETURN' TO CONTINUE -

Figure 4.24

These values are obtained by multiplying the assignment averages of the Assignment Data displays (Figures 4.18 through 4.20) by the penalties (substitution time penalties plus commanders reaction time penalties) associated with the assignment. As an example the section leader had a reaction time of 10 minutes and a substitution penalty for the Platoon Leader of 30 minutes. 40 minutes times one sixth of an assignment per replication yields the 6.67 minutes expected in Figure 4.22. If the reader refers back to Figure 4.11 it can be seen that following the fifth replication the last maximum penalty was 40 and that only four teams were attained.

In Figure 4.25 we are returned to the main menu.

```
SOLUTION RESULT SCREEN PRINTS

 ORGCAP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     PROGRAM AND FILE OPTIONS
 2     SOLVE

 3     LINEPRINT
 4     OPTIMAL SUMMARY
 5     ASSIGNMENT DATA
 6     EXPECTED ASSIGNMENT PENALTIES

 7     NEEDS AND SURPLUS CALCULATIONS

ENTER YOUR CHOICE - ?7
```

Figure 4.25

We enter 7 and initiate the sequence of the needs and surplus calcualtions.

4.8 NEEDS AND SURPLUS CALCULATIONS AND DISPLAYS

```
THERE ARE 6 TEAMS ENTER GOAL TEAM LEVEL
 5

REPL 1 SUPPLY EXCEEDS DEMAND BY 5
REPL 2 SUPPLY EXCEEDS DEMAND BY 4
REPL 3 SUPPLY EXCEEDS DEMAND BY 3
REPL 4 SUPPLY EXCEEDS DEMAND BY 1
REPL 5 DEMAND EXCEEDS SUPPLY BY 2
REPL 6 DEMAND EXCEEDS SUPPLY BY 3
```

Figure 4.26

We are again prompted for a goal team level and enter 5. All replications will now calculate short falls preventing the attainment of 5 teams or surplusses to the building of 5 teams.

A needs and surplusses summary signals the end of these calculations.

```
NEEDS AND SURPLUSSES
 ORGCAP - SCOUT PLATOON - PERSONNEL
GOAL 5 TEAMS AFTER 6 REPLICATIONS

                  NEEDS      SURPLUSSES

01 PLT LDR         .17          0
02 PLT SGT          0           .17
03 GUNNER           0           .5
04 SCOUT            0           0
05 SCOUT DVR        0           .33
06 SECT LDR         0           0
07 SQD LDR          .17         0
08 GUNNER           .33         1.17
09 SCOUT            .17         0
10 SCOUT DVR        0           0
11 SCOUT            0           0

HIT 'RETURN' TO CONTINUE -
```

Figure 4.27

These numbers result from a summation during each replication and a final division by the number of replications. Notice a platoon leader was needed for one replication. That was one of the replications where only four teams could be built. (A Platoon Leader is required for five or more teams on the MET.)

The return key changes the display to the main menu.

```
SOLUTION RESULT SCREEN PRINTS

 ORGCAP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     PROGRAM AND FILE OPTIONS
 2     SOLVE

 3     LINEPRINT
 4     OPTIMAL SUMMARY
 5     ASSIGNMENT DATA
 6     EXPECTED ASSIGNMENT PENALTIES

 7     NEEDS AND SURPLUS CALCULATIONS
 8     SEE NEEDS AND SURPLUS

ENTER YOUR CHOICE - ?3
```

Figure 4.28

Notice an option 8 has been added. We may now display (or lineprint) the needs and surplusses.

At this point we could recalculate needs and surplusses for other goal team levels. We could also re-solve the assignment simulation for other sampled survivor sets.

4.9 LINEPRINTING

We can line print any of the results by entering 3.

```
SOLUTION RESULT LINEPRINTS

 ORGCAP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     OTHER OPTIONS

 2     OPTIMAL SUMMARY
 3     ASSIGNMENT DATA
 4     EXPECTED ASSIGNMENT PENALTIES

 5     NEEDS AND SURPLUS PRINT

ENTER YOUR CHOICE - ?1
```

Figure 4.29

Or return to the main menu by entering 1 from the print menu.

```
SOLUTION RESULT SCREEN PRINTS

 ORGCAP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     PROGRAM AND FILE OPTIONS
 2     SOLVE

 3     LINEPRINT
 4     OPTIMAL SUMMARY
 5     ASSIGNMENT DATA
 6     EXPECTED ASSIGNMENT PENALTIES

 7     NEEDS AND SURPLUS CALCULATIONS
 8     SEE NEEDS AND SURPLUS

ENTER YOUR CHOICE - ?1
```

Figure 4.30

By entering 1 we select Program and File Options.

```
P R O G R A M   O P E R A T I O N S

 ORGCAP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     CATALOG,D1
 2     CATALOG,D2

 3     UNLOCK, SAVE, LOCK ORGCAP,D1
 4     UNLOCK, SAVE, LOCK ORGCAP,D2

 5     RUN PREP
 6     RUN TIME CAP SIMULATOR

 7     SAVE SURVIVOR FILE
 8     SAVE CAPABILITY FILE

 9     STOP
10     OTHER OPTIONS

ENTER YOUR CHOICE - ?9
```

Figure 4.31

With this menu we can see what files and programs are on a disk. We can save this program (after tailored modification), run the other two programs of the AMORE system, or save or rewrite current resident survivor or capability data*. We can save survivor or capability files either during the solution or by using this menu.

Finally we may stop (enter 9) or return to the main menu (enter 10).

* If the user wishes automatic audit trailing of files and data used, he should save a capability file always after a survivor file.

4.11 MATERIEL DATA FILES

After the user has created a materiel data file using the Preprocesssor, it may be run with Organizational Capability Simulator with minor differences from the procedure for personnnel.

The user may load or run the Organizational Capability Simulator as if he were processing a personnel file. But when prompted for file name, the file name entered is the materiel file name of interest. The program will then automatically reprogram itself for materiel. The user restarts the new program by typing "RUN."

An alternative is to load the Organizational Capability Simulator by typing and entering "LOAD ORGCAP" or by calling from other programs and stopping the run sequence.

Once the ORGCAP program is in computer memory, the user may then type and enter "EXEC ORGMAT". What happens next is the same as the computer re-programming itself. Actually, some new and modified programming is being merged with the ORGCAP program. This technique was selected to preserve disk storage space*.

We illustrate invoking the materiel solution format. Since we already had "ORGCAP" in computer memory (from running the personnel base), we can merely type "RUN". In this case, we did not need to type "RUN ORGCAP" since "ORGCAP" did not need to be entered from disk memory to computer memory. "RUN" leads to Figure 4.32.

* If the user has room, he could store this new merged program on a separate disk by a command such as "SAVE ORGMAT". With the new disk in place, he could simply type in "RUN ORGMAT".

```
]RUN
     O R G A N I Z A T I O N A L
          C A P A B I L I T Y
          S I M U L A T O R
          P E R S O N N E L

ENTER DATA FILE NAME
 SCOUTM

READING IN SCOUT PLATOON - MATERIEL
 DATA
```

Figure 4.32

The procedure then follows that for personnel. But after a few moments the program "senses" the materiel format and the display gives way to Figure 4.33. A series of brackets appears successively on the left side of the screen.

```
ADJUSTING PROGRAM FOR MATERIEL
 WHEN DONE, ENTER 'RUN'
```

Figure 4.33

While the brakcets are appearing, the resident computer memory is being reprogrammed. After the brackets stop appearing, we type "RUN" and proceed as with personnel. We will not repeat the same process, but will show a sample of the average assignments display to appreciate the format differences.

4.12 AVERAGE ASSIGNEMENTS - DISPLAY

Figures 4.34, 4.35, 4.36 and 4.37 show successfully the screen displays for a post capability calculation based on the "SCOUTM" file.

```
ORGMAT - SCOUT PLATOON - MATERIEL
 AVERAGE ASGMTS - UNUSED FEASIBILITY

   SKILL          1     2     3     4     5

01 CHEM ALARM     F     -     -     -     -
02 CFV M3         -    1.2    -     -     -
03 IM-74          -     -     F     -     -
04 AN/VRC-46      -     -     -    1.3    F
05 AN/VRC-160     -     -     -     F    1.0
06 CHEM ALARM     F     -     -     -     -
07 CFV M3         -     F     -     -     -
08 IM-174         -     -     F     -     -
09 AN/VRC-46      -     -     -     F     F
10 AN/GRC-160     -     -     -     F     F
01 CHEM A LT      F     -     -     -     -
02 CFV M3 LT      -    .2     -     -     -
03 IM-74  LT      -     -     F     -     -
04 AN/VRC LT      -     -     -     F     F
05 AN/VRC LT      -     -     -     F    .2

HIT 'RETURN' TO CONTINUE -
```

Figure 4.34

```
ORGMAT - SCOUT PLATOON - MATERIEL
 AVERAGE ASGMTS - UNUSED FEASIBILITY

   SKILL          1     2     3     4     5

06 CHEM A LT      F     -     -     -     -
07 CFV M3 LT      -     F     -     -     -
08 IM-174 LT      -     -     F     -     -
09 AN/VRC LT      -     -     -     F     F
10 AN/GRC LT      -     -     -     F     F
01 CHEM A MOD     F     -     -     -     -
02 CFV M3 MOD     -     F     -     -     -
03 IM-74  MOD     -     -     F     -     -
04 AN/VRC MOD     -     -     -     F     F
05 AN/VRC MOD     -     -     -     F     .2
06 CHEM A MOD     F     -     -     -     -
07 CFV M3 MOD     -     F     -     -     -
08 IM-174 MOD     -     -     F     -     -
09 AN/VRC MOD     -     -     -     F     F
10 AN/GRC MOD     -     -     -     F     F
```

Figure 4.35

```
HIT 'RETURN' TO CONTINUE -
ORGMAT - SCOUT PLATOON - MATERIEL
 AVERAGE ASGMTS - UNUSED FEASIBILITY

   SKILL          6     7     8     9     10

01 CHEM ALARM     F     -     -     -     -
02 CFV M3         -     .2    -     -     -
03 IM-74          -     -     F     -     -
04 AN/VRC-46      -     -     -     F     F
05 AN/VRC-160     -     -     -     .2    .2
06 CHEM ALARM     1.8   -     -     -     -
07 CFV M3         -     3.2   -     -     -
08 IM-174         -     -     1.7   -     -
09 AN/VRC-46      -     -     -     1.7   F
10 AN/GRC-160     -     -     -     F     3.5
01 CHEM A LT      F     -     -     -     -
02 CFV M3 LT      -     F     -     -     -
03 IM-74  LT      -     -     F     -     -
04 AN/VRC LT      -     -     -     F     F
05 AN/VRC LT      -     -     -     F     F

HIT 'RETURN' TO CONTINUE -
```

Figure 4.36

```
ORGMAT - SCOUT PLATOON - MATERIEL
 AVERAGE ASGMTS - UNUSED FEASIBILITY

   SKILL          6     7     8     9     10

06 CHEM A LT      F     -     -     -     -
07 CFV M3 LT      -     .2    -     -     -
08 IM-174 LT      -     -     .2    -     -
09 AN/VRC LT      -     -     -     F     F
10 AN/GRC LT      -     -     -     F     F
01 CHEM A MOD     F     -     -     -     -
02 CFV M3 MOD     -     F     -     -     -
03 IM-74  MOD     -     -     F     -     -
04 AN/VRC MOD     -     -     -     F     F
05 AN/VRC MOD     -     -     -     F     F
06 CHEM A MOD     F     -     -     -     -
07 CFV M3 MOD     -     .3    -     -     -
08 IM-174 MOD     -     -     F     -     -
09 AN/VRC MOD     -     -     -     .2    F
10 AN/GRC MOD     -     -     -     F     .2

HIT 'RETURN' TO CONTINUE -
```

Figure 4.37

Due to screen limits, fifteen lines at a time are displayed (4.34 and 4.35 do this for the first five columns; 4.36 and 4.37 do this for the second five columns). When these are lineprinted, all line items are printed five columns at a time.

Notice that materiel titles comprise items 1 through 10. After that they appear in truncated form with the labels "LT" or "MOD" added.

Recall that materiel had light, moderate and severe damage categories. Accordingly the first 10 lines were the assignment of items which survived undamaged. Lines 11 through 20 account for lightly damaged items and 21 through 30, moderately damaged items.

Thus where a number (like .2) appears it indicates damaged items to be repaired to maximize capability. The "F"s indicate feasible assignment not used.

We do not show needs and surplus displays but needs will always be shown within the undamaged lines. Surplusses in the light and moderate lines indicate items whose repair will not add to capability.

CHAPTER 5
OPERATING THE TIME CAPABILITY SIMULATOR

5.0 OVERVIEW

The Time Capability Simulator converts assignment distribution solution information from the Organizational Capability Simulator together with time penalty data from the Preprocessor into capability as a function of time.

5.1 RUN SEQUENCE

We can start this simulation in the same general ways as for the Organizational Capability Simulator.

- o "RUN TIMECAP"
- o Select an option from the Preprocessor
- o Select an option from the Organizational Capability Simulator
- o "RUN AMORE"

We chose the last option and got Figure 5.1.

W E L C O M E

T O T H E

A M O R E

M O D E L S Y S T E M

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Figure 5.1

Entering any key initiates the next display.

```
R U N   O P T I O N S

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO SET

 1     PREPROCESSOR

 2     ORGANIZATIONAL CAPABILITY

 3     TIME CAPABILITY

 4     CAPABILITY COORDINATION

 5     SURVIVABILITY LINKAGE

 6     STOP

ENTER YOUR CHOICE - 3
```

Figure 5.2

Choosing 3 loads and runs the Time Capability Simulator. While loading, Figure 5.1 is displayed.

```
T I M E

C A P A B I L I T Y

S I M U L A T O R

ENTER CAPABILITY FILE NAME
 CAPSCOP6

THE SCOUTP CAPABILITY FILE
 IS NOW BEING READ IN
  FOR A 6 REPLICATION AMORE CASE

READING IN INPUT DATA FOR

CAP/TIME - SCOUT PLATOON - PERSONNEL

READING ASSIGNMENT PATTERNS OF THE
 CAPSCOP6 CAPABILITY FILE - BASED ON
  THE SCOUTP DATA FILE

HOW MANY TIME DATA POINTS -
 (MAXIMUM FOR DIMENSIONING PURPOSES)?
```

Figure 5.3

After some processing the messages in Figure 5.3 appear in sequence and we are finally prompted to enter a maximum number of time data points.

The messages to this point confirm the file reading (CAPSCOP6) and its associated unit data file (SCOUTP).

5.2 TIME DISTRIBUTION SEQUENCE

The computer automatically reads in 23 time data points including zero time. We can increase or lessen that number and redesignate any specific points. We entered 23 which led to the next progressive display.

```
IF YOU WISH TO READ IN
 A SAVED TIME DISTRIBUTION FILE,
  ENTER 'TIME' -
CAP/TIME - SCOUT PLATOON - PERSONNEL
 'SCOUTP' UNIT DATA FILE
  'CAPSCOP6' CAPABILITY FILE
    BASED ON SAMPLE FILE 'SAMSCOP6'


PROCESSING
CAP/TIME - SCOUT PLATOON - PERSONNEL
 'SCOUTP' UNIT DATA FILE
  'CAPSCOP6' CAPABILITY FILE
    BASED ON SAMPLE FILE 'SAMSCOP6'


CAPABILITY LIMIT SUMMARY

EXPECTED ZERO TIME TEAM CAPABILITY
 IS 2.67 TEAMS OR 44.44 %

EXPECTED MINIMUM
 RECONSTITUTION TEAM CAPABILITY
 IS 2.5 TEAMS OR 41.67 %


EXPECTED MAXIMUM TEAM CAPABILITY
 IS 5 TEAMS OR 83.33 %


HIT 'RETURN' TO CONTINUE -
```

Figure 5.4

The display began with an option for entering a time distribution file.

Any time distribution generated by this simulator can be saved for later study at alternate time data points. We bypassed the option (entering a time distribution file) for now and will generate our own.

The last lines of Figure 5.4 develop progressively and summarize some interesting capability limits. The zero time capability is that cability which exists before reconstitution starts (2.67 teams average out of six).

The expected minimum reconstitution team capability is that capability that is available just after reconstitution starts (2.5 teams).

The expected maximum is the upper bound, reconstitutable capability (5 teams).

Hitting Return summarizes the team distribution of these capabilities:

CAPABILITY COUNT COMPARISON

TEAMS	ZERO TIME	MINIMUM RECONST	MAXIMUM
1	0	1	0
2	4	3	0
3	0	0	0
4	2	2	2
5	0	0	2
6	0	0	2

HIT 'RETURN' TO CONTINUE -

Figure 5.5

The reader may recall the same maximum distribution (from the last chapter) generated in the Organizational Capability Simulator.

Hitting the return key initiates time distribution calculations. If we had successfully entered a time distribution file this step would have been bypassed.

```
YOU HAVE THE OPTION OF USING EITHER
 EXPECTED VALUE OR DISTRIBUTED TIMES

IF YOU CHOOSE RANDOMLY DISTRIBUTED
 TIMES ENTER 'R' - R


SORTING THE TIMES
```

Figure 5.6

The analyst may use expected times (developed in the Preprocessor) to generate capability or may sample random times. We entered R and chose to sample. After some processing the next display sequence appears.

```
 IF YOU WISH TO SAVE THE TIME
  DISTRIBUTION ARRAY, ENTER 'TIME' - TIME
ENTER TIME DISTRIBUTION FILE NAME
 TIMSCOP6R

IF YOU WISH TO DELETE A FILE
 WITH THE SAME NAME, ENTER 'D' -

IF YOU WISH TO CREATE THE FILE,
 ENTER 'C' - C
CREATING TIMSCOP6R,D1

IF YOU WISH TO BACK UP,
ENTER 'B' -
```

Figure 5.7

5.3 TIME DISTRIBUTION FILE SAVING

We chose to save this new time distribution data to be called TIMSCOP6R.

- o TIM for a time distribution file
- o SCO for the first 3 letters at the associated Scout Platoon data file
- o P for personnel
- o 6 for the number of replications in the Organizational Capability Simulator
- o R for a choice of random times.

All related file information which generated this data will be stored on the TIMSCOP6R file. Note in Figure 5.7 we deleted a previous file with the same name and also made a back-up.

5.4 OPTIONS

We are led to the main menu of options.

```
ALGORITHM OPERATIONS AND SCREEN PRINTS

 CAP/TIME - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     PROGRAM AND FILE OPTIONS
 2     LINEPRINT

 3     ZERO TIME CAPABILITY
 4     MINIMUM RECONSTITUTION CAPABILITY
 5     MAXIMUM CAPABILITY

 6     SEE ZERO TI, MIN REC, & MAX CAP
 7     SOLVE CAPABILITY VS TIME

ENTER YOUR CHOICE - ?3
```

Figure 5.8

Entries 1 and 2 have almost exactly the same functions as they did in the Organizational Capability Simulator. Entering in turn, 3, 4 and 5 generates the displays in Figures 5.9, 5.10, 5.11, 5.12, 5.13 and 5.14.

5.5 CAPABILITY DISPLAYS

```
CAP/TIME - SCOUT PLATOON - PERSONNEL

SCOUTP, CAPSCOP6, AND SAMSCOP6
 FILES USED

TEAMS AT ZERO TIME BY REPLICATION

R 1/T 4    R 2/T 4    R 3/T 2    R 4/T 2
R 5/T 2    R 6/T 2

HIT 'RETURN' TO CONTINUE -
```

Figure 5.9

```
ZERO TIME TEAM FREQUENCY COUNT

   1      0
   2      4
   3      0
   4      2
   5      0
   6      0


HIT 'RETURN' TO CONTINUE -
```

Figure 5.10

```
CAP/TIME - SCOUT PLATOON - PERSONNEL

SCOUTP, CAPSCOP6, AND SAMSCOP6
 FILES USED

TEAMS AT MINIMUM RECONSTITUTION
 BY REPLICATION

R 1/T 4    R 2/T 4    R 3/T 2    R 4/T 2
R 5/T 1    R 6/T 2

HIT 'RETURN' TO CONTINUE -
```

Figure 5.11

```
MINIMUM RECONSTITUTION
 TEAM FREQUENCY COUNT

   1      1
   2      3
   3      0
   4      2
   5      0
   6      0

HIT 'RETURN' TO CONTINUE -
```

Figure 5.12

```
CAP/TIME - SCOUT PLATOON - PERSONNEL

SCOUTP, CAPSCOP6, AND SAMSCOP6
 FILES USED

TEAMS AT MAXIMUM BY REPLICATION

R 1/T 6    R 2/T 6    R 3/T 5    R 4/T 5
R 5/T 4    R 6/T 4

HIT 'RETURN' TO CONTINUE -
```

Figure 5.13

```
MAXIMUM CAPABILITY TEAM COUNT

  1      0
  2      0
  3      0
  4      2
  5      2
  6      2


HIT 'RETURN' TO CONTINUE -
```

Figure 5.14

These displays are each in two parts. First, team capability is given by replication number. Then a frequency summary is given. At the top of the first of the two displays are summarized the Files used. SCOUTP was the original data generated in the Preprocessor. CAPSCOP6 was output from the Organizational Capability Simulator, entered to initiate the Time Capability Simulator sequence.

The SAMSCOP6 entry would be blank if the survivor data had not been saved. These summaries provide an audit trail for particular cases.

Notice that in Figure 5.11 the fifth number set is R 5/T 1 this means that the minimum reconstitution team capability during the 5th replication was 1. That is the lowest capability of the six replications. This was the instance where the Platoon leader was incapacitated with no replacement available.

Figure 5.15 reflects return to the main menu.

```
ALGORITHM OPERATIONS AND SCREEN PRINTS

 CAP/TIME - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     PROGRAM AND FILE OPTIONS
 2     LINEPRINT

 3     ZERO TIME CAPABILITY
 4     MINIMUM RECONSTITUTION CAPABILITY
 5     MAXIMUM CAPABILITY

 6     SEE ZERO TI, MIN REC, & MAX CAP
 7     SOLVE CAPABILITY VS TIME

ENTER YOUR CHOICE - ?7
```

Figure 5.15

5.6 CAPABILITY VS TIME CALCULATION

We can initiate the capability as a function of time calculation by entering 7.

```
HOW MANY TIME DATA POINTS - 23
CURRENT DEFAULT TIMES ARE AS FOLLOWS

 0 0    HRS     1   .1 HRS     2   .2 HRS
 3   .3 HRS     4   .4 HRS     5   .5 HRS
 6   .6 HRS     7   .7 HRS     8   .8 HRS
 9   .9 HRS    10  1   HRS    11  1.2 HRS
12  1.4 HRS    13  1.6 HRS    14  1.8 HRS
15  2   HRS    16  2.5 HRS    17  3   HRS
18  3.5 HRS    19  4   HRS    20  5   HRS
21  6   HRS    22  8   HRS

IF YOU WISH TO CHANGE ANY
 ENTER 'CHA' - CHA
```

Figure 5.16

We are first prompted for a number of time data points desired. The number we enter may be any number less than or equal to the earlier dimensioning number we entered. We continue with 23.

The computer automatically reads in a default set of 23 data points (including a zero time point) and these are displayed next in Figure 5.16.

We elected to demonstrate changing one of these points and entered "CHA".

```
EDIT ---> TIME DATA POINTS

 CAP/TIME - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SEQUENTIAL PRESENTATION
 2     SELECTIVE PRESENTATION
 3     RETURN

ENTER YOUR CHOICE - ?2
```

Figure 5.17

5.7 EDITING TIME DATA POINTS

The display is similar to previous Preprocessor editing formats. We elected to change selectively by entering 2..

```
EDIT COMMANDER'S REACTION TIME
 SELECTIVELY

ENTER LINE ITEM NUMBER - 12
EDIT COMMANDER'S REACTION TIME
 ENTER 'EX' TO EXIT
       'RETURN' TO LEAVE VALUE UNCHANGED
CURRENT TIME DATA POINT IS
 DATA POINT 12 '1.4'

  YOUR ENTRY IS 2
```

Figure 5.18

We chose to change data point 12. The default value of time 12 is 1.4 hours we raised it to 2. If the reader refers back to Figure 5.16, he will note that this is higher than data points 13 and 14 and equal to data point 15. The process will automatically adjust these points to keep the sequence increasing. We are returned to the edit options.

```
EDIT ---> TIME DATA POINTS

 CAP/TIME - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SEQUENTIAL PRESENTATION
 2     SELECTIVE PRESENTATION
 3     RETURN

ENTER YOUR CHOICE - ?3
```

Figure 5.19

We enter 3 to return to main processing. Note that in the next display the computer informs of the adjustment of data points 14 and 15.

```
PROCESSING
ADJUSTING 13 POINT
ADJUSTING 14 POINT
ADJUSTING 15 POINT

HIT 'RETURN' TO CONTINUE -
```

Figure 5.20

Pressing Return shows the new data points.

```
CURRENT DEFAULT TIMES ARE AS FOLLOWS

 0 0    HRS     1   .1 HRS     2   .2 HRS
 3  .3  HRS     4   .4 HRS     5   .5 HRS
 6  .6  HRS     7   .7 HRS     8   .8 HRS
 9  .9  HRS    10  1   HRS    11  1.2 HRS
12  2   HRS    13  2.1 HRS    14  2.2 HRS
15  2.3 HRS    16  2.5 HRS    17  3   HRS
18  3.5 HRS    19  4   HRS    20  5   HRS
21  6   HRS    22  8   HRS

IF YOU WISH TO CHANGE ANY
 ENTER 'CHA' -
```

Figure 5.21

Data points 12, 13, 14 and 15 are now 2, 2.1, 2.2, and 2.3 respectively to preserve increasing time.

5.8 CAPABILITY AS A FUNCTION OF TIME

As capability as a funtion of time is being calculated, the first two lines of Figure 5.22 are displayed.

Finally the remainder of Figure 5.22 is displayed.

```
CAPABILITY AS A FUNCTION OF TIME
 BEING CALCULATED
CAP/TIME - SCOUT PLATOON - PERSONNEL
 'SCOUTP' UNIT DATA FILE
  'CAPSCOP6' CAPABILITY FILE
    BASED ON SAMPLE FILE 'SAMSCOP6'
     RANDOM TIMES      'TIMSCOP6R'

CAPABILITY AS A FUNCTION OF TIME

TIME          CAPABILITY
(HRS)     (6 MAX TEAMS)      PERCENT

   0            2.8           46.7 %
  .1            3.2           53.3 %
  .2            3.3           55.0 %
  .3            4.2           70.0 %
  .4            4.2           70.0 %
  .5            4.5           75.0 %
  .6            4.5           75.0 %
  .7            4.5           75.0 %
  .8            4.5           75.0 %
  .9            4.5           75.0 %
 1.0            5.0           83.3 %
 1.2            5.0           83.3 %
 2.0            5.0           83.3 %
 2.1            5.0           83.3 %
 2.2            5.0           83.3 %

HIT 'RETURN' TO CONTINUE -
```

Figure 5.22

Notice that the title of Figure 5.22 chronicles the files in use as a basis of audit and consistency. Only 15 lines of data at a time are displayed on the visual screen mode. Entering "RETURN" will display the rest of the 23 time data points as in Figure 5.23

```
CAP/TIME - SCOUT PLATOON - PERSONNEL
  'SCOUTP' UNIT DATA FILE
   'CAPSCOP6' CAPABILITY FILE
     BASED ON SAMPLE FILE 'SAMSCOP6'
      RANDOM TIMES      'TIMSCOP6R'

CAPABILITY AS A FUNCTION OF TIME

TIME          CAPABILITY
(HRS)      (6 MAX TEAMS)      PERCENT

  2.3            5.0           83.3 %
  2.5            5.0           83.3 %
  3.0            5.0           83.3 %
  3.5            5.0           83.3 %
  4.0            5.0           83.3 %
  5.0            5.0           83.3 %
  6.0            5.0           83.3 %
  8.0            5.0           83.3 %

HIT 'RETURN' TO CONTINUE -
```

Figure 5.23

The data in Figures 5.22 and 5.23 show the capability at each preselected time data point. The middle column is averaged across all replications. The third column is the middle column expressed as a percentage of total possible teams. In this case, six teams are the total possible.

We can save this Time/Capability data for comparison with that of materiel in the capability coordination module. We must first return to the main menu by entering "RETURN".

```
ALGORITHM OPERATIONS AND SCREEN PRINTS

 CAP/TIME - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     PROGRAM AND FILE OPTIONS
 2     LINEPRINT

 3     ZERO TIME CAPABILITY
 4     MINIMUM RECONSTITUTION CAPABILITY
 5     MAXIMUM CAPABILITY

 6     SEE ZERO TI, MIN REC, & MAX CAP
 7     SOLVE CAPABILITY VS TIME
 8     PRINT CAPABILITY VS TIME
 9     GENERATE NEW TIME DISTRIBUTIONS

ENTER YOUR CHOICE - ?1
```

Figure 5.24

We select Program and File Options by entering 1.

```
P R O G R A M   S A V I N G

 CAP/TIME - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     CATALOG,D1
 2     CATALOG,D2

 3     UNLOCK, SAVE, LOCK TIMCAP,D1
 4     UNLOCK, SAVE, LOCK TIMCAP,D2

 5     RUN PREPROCESSOR
 6     RUN ORG CAPABILITY SIMULATOR

 7     FILE OPERATIONS

 8     STOP
 9     OTHER OPTIONS

ENTER YOUR CHOICE - ?7
```

Figure 5.25

Next we select File Options by entering 7 to get the menu in Figuire 5.26. We are interested in option 3.

```
F I L E   O P E R A T I O N S

 CAP/TIME - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     TIME DIST FILE SAVE
 2     TIME DIST FILE READ IN

 3     SAVE CAPABILITY AS F(T)
 4     RUN COORDINATED CAPABILITY PROG

 5     OTHER OPTIONS

ENTER YOUR CHOICE - ?3
```

Figure 5.26

We may also store a time distribution file or read in an alternative time distribution. We may also run the capability coordination module from here.

```
ENTER CAPABILITY VERSUS TIME FILE NAME
 CFTSCOP6R

IF YOU WISH TO DELETE A FILE
 WITH THE SAME NAME, ENTER 'D' -

IF YOU WISH TO CREATE THE FILE,
 ENTER 'C' - C
CREATING CFTSCOP6R,D1

IF YOU WISH TO BACK UP,
ENTER 'B' -
```

Figure 5.27

We store on disk a capability-as-a-function-of-time file called "CFTSCOP6R."

- o "CFT" for capability as a function of time
- o "SCO" for Scout Platoon
- o "P" for personnel
- o "6" fpr sox replications
- o "R" for random times

5.9 INCOMPATIBLE FILE PROTECTION

We now return to the consideration of entering a time distribution file. Can it be done improperly Let us begin with a new personnel file.

```
                T I M E

          C A P A B I L I T Y

              S I M U L A T O R

ENTER CAPABILITY FILE NAME
 CAPSCOM6

THE SCOUTM CAPABILITY FILE
 IS NOW BEING READ IN
  FOR A 6 REPLICATION AMORE CASE

READING IN INPUT DATA FOR

CAP/TIME - SCOUT PLATOON - MATERIEL

READING ASSIGNMENT PATTERNS OF THE
 CAPSCOM6 CAPABILITY FILE - BASED ON
  THE SCOUTM DATA FILE

HOW MANY TIME DATA POINTS -
 (MAXIMUM FOR DIMENSIONING PURPOSES)?
```

Figure 5.28

We initiated a new run of the Time Capability Simulator. This simulator will not operate without a proper capability file generated in the organizational capability simulator. We read in "CAPSCOM6." "CAPSCOM6" is a capability file resulting from running the scout platoon materiel unit data file in the Organization's Capability Simulation. After processing, we were prompted for time data point dimensioning. We entered 23 and got the next sequence.

```
IF YOU WISH TO READ IN
 A SAVED TIME DISTRIBUTION FILE,
  ENTER 'TIME' - TIME
ENTER TIME DISTRIBUTION FILE NAME
 TIMSCOP6R

INCOMPATIBLE

SCOUTP VERSUS SCOUTM
CAPSCOP6 VERSUS CAPSCOM6
6 REPLICATIONS VS 6
SAMSCOP6 SURVIVORS VS SAMSCOM6

HIT 'RETURN' TO CONTINUE -
```

Figure 5.29

We were given the opportunity to enter a time capability distribution file. We try entering one just generated for personnel and filed.

"TIMSCOP6R"

and automatically get an incompatibility message with a comparison of associated file audits. There were three discrepencies. Any one would have aborted the file data and the processing continues at this point as if the time distribution file had not been entered.

CHAPTER 6

OPERATING THE CAPABILITY COORDINATOR MODULE

6.0 OVERVIEW

The Capability Coordination Module transforms personnel and materiel capability-as-a-function-of-time (CFT) files into coordinated unit CFT data. The input files are separately developed by the user using the Time Capability Simulator. But they will be coordinated with respect to teams, replications, and time data points. Selected outputs will automatically develop and present a 90% confidence interval of average capability estimation.

6.1 RUN SEQUENCE

We can start this module in manners similar to those for the Time Capability Simulator.

- o "RUN CORCAP"
- o Select an option from the Time Capability Simulator
- o "RUN AMORE" then select the Capability Coordination Option
- o Enter "LOAD CORCAP" followed by "RUN"

6.2 FILE READ IN

However the program is run, the following displays occur:

```
C A P A B I L I T Y

C O O R D I N A T O R

M O D U L E


ENTER FIRST CAPABILITY-VS-TIME
 FILE NAME - CFTSCOM6

ENTER SECOND CAPABILITY-VS-TIME
 FILE NAME - CFTSCOP6

READING CFTSCOP6

READING CFTSCOM6
```

Figure 6.1

The program requires that a personnel and materiel CFT file be entered. The program will tolerate any order of entry. In the case shown, the materiel file was entered first. File acceptance is reflected by the last two statements in Figure 6.1.

If two materiel or two personnel CFT files are entered the program will abort with appropriate diagnostic instructions.

Processing leads to the display of Figure 6.2.

```
STATIC CAPABILITY - SCREEN DISPLAYS

CORCAP - SCOUT PLATOON - PERSONNEL
CORCAP - SCOUT PLATOON - MATERIEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     PROGRAM AND FILE OPTIONS
 2     LINEPRINT

 3     ZERO TIME CAPABILITY
 4     MINIMUM RECONSTITUTION CAPABILITY
 5     MAXIMUM CAPABILITY

 6     DYNAMIC CAPABILITY

 7     FILE AND DATA AUDIT

ENTER YOUR CHOICE - ?3

PROCESSING
```

Figure 6.2

Note that the title reflects the entry of personnel and materiel files.

Options 1 and 2 are similar to those of the other AMORE programs.

Option 3 is selected and after 2 "RETURN"s the display to appear as in Figure 6.3.

```
TEAMS AT ZERO TIME BY REPLICATION

   PERSONNEL

R 1/T 4    R 2/T 4    R 3/T 2    R 4/T 2
R 5/T 2    R 6/T 2

HIT 'RETURN' TO CONTINUE -


   MATERIEL

R 1/T 4    R 2/T 3    R 3/T 1    R 4/T 5
R 5/T 3    R 6/T 1

HIT 'RETURN' TO CONTINUE -


   COMBINED

R 1/T 4    R 2/T 3    R 3/T 1    R 4/T 2
R 5/T 2    R 6/T 1

HIT 'RETURN' TO CONTINUE -
```

Figure 6.3

This display shows the number of capable teams existing by replication at zero time for personnel, materiel and "COMBINED."

The combined output reflects a coordinated capability. This derived capability is coordinated as follows. For each replication, the minimum of the personnel and materiel capability is used to measure the unit capability.

Notice that for replication 2, personnel had 4 teams and materiel 3 teams. The combined capability is the minimum, i.e., 3 teams. In the fifth replication, the personnel 2 teams was the minimum. This individually replicated combined capability is always less than or equal to any individual personnel or materiel capability. Hitting "RETURN" three times displays the results in Figure 6.4.

```
ZERO TIME TEAM FREQUENCY COUNT

   PERSONNEL

TEAMS    NUMBER
BUILT   OF TIMES

  2         4
  4         2


HIT 'RETURN' TO CONTINUE -



   MATERIEL

TEAMS    NUMBER
BUILT   OF TIMES

  1         2
  3         2
  4         1
  5         1


HIT 'RETURN' TO CONTINUE -



   COMBINED

TEAMS    NUMBER
BUILT   OF TIMES

  1         2
  2         2
  3         1
  4         1


HIT 'RETURN' TO CONTINUE -
```

Figure 6.4

This display contains information similar to a comparable display in the Time Capability Simulator. However, in this program, all zero capabilities are suppressed and will not show. Also, if no teams could be built, zero teams will be shown with its appropriate frequency.

Hitting "RETURN" returns the main menu.

```
STATIC CAPABILITY - SCREEN DISPLAYS

CORCAP - SCOUT PLATOON - PERSONNEL
CORCAP - SCOUT PLATOON - MATERIEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     PROGRAM AND FILE OPTIONS
 2     LINEPRINT

 3     ZERO TIME CAPABILITY
 4     MINIMUM RECONSTITUTION CAPABILITY
 5     MAXIMUM CAPABILITY

 6     DYNAMIC CAPABILITY

 7     FILE AND DATA AUDIT

ENTER YOUR CHOICE - ?6
```

Figure 6.5

Options 4 and 5 have the same formats as option 3 but will show minimum reconstitution capability and maximum capability, respectively. We enter 6 to get a new menu for dynamic capability options.

```
DYNAMIC CAPABILITY - SCREEN DISPLAYS

CORCAP - SCOUT PLATOON - PERSONNEL
CORCAP - SCOUT PLATOON - MATERIEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     TEAM CAP AS F(T)
 2     PERCENT CAP AS F(T)

 3     PSNL CAP W/CONF INT
 4     MAT CAP W/CONF INT
 5     COMB CAP W/CONF INT

 6     LINEPRINT
 7     OTHER OPTIONS

ENTER YOUR CHOICE - ?1
```

Figure 6.6

Dynamic option 1 leads to the next display.

CORCAP - SCOUT PLATOON - PERSONNEL
CORCAP - SCOUT PLATOON - MATERIEL

CAPABILITY AS A FUNCTION OF TIME

NUMBER OF TEAMS

TIME	PERSONNEL (6 TMS)	MATERIEL (6 TMS)	COMBINED (6 TMS)
0	2.8	2.8	2.3
.1	3.3	3.5	2.7
.2	4.2	3.5	3.0
.3	4.8	3.5	3.3
.4	4.8	4.0	3.7
.5	4.8	4.0	3.7
.6	4.8	4.0	3.7
.7	5.0	4.0	3.7
.8	5.0	4.0	3.7
.9	5.0	4.0	3.7
1.0	5.0	4.0	3.7
1.2	5.0	4.0	3.7
1.4	5.0	4.0	3.7
1.6	5.0	4.0	3.7
1.8	5.0	4.0	3.7

HIT 'RETURN' TO CONTINUE -

Figure 6.7

This display reflects average teams (of six replications) as a function of the time data points entered back in the Time Capability Simulation. The display will show only those results for Time Data Points in common to both personnel and materiel CFT files.

The combined average is derived as follows. For each time data point and each replication, the minimum number of teams of personnel and materiel is selected for the combined capability. The combined capability is then averaged across the replications for each time data point. The screen display shows 16 lines at a time; entering "RETURN" shows the last of the 23 time data points.

CORCAP - SCOUT PLATOON - PERSONNEL
CORCAP - SCOUT PLATOON - MATERIEL

CAPABILITY AS A FUNCTION OF TIME

NUMBER OF TEAMS

TIME	PERSONNEL (6 TMS)	MATERIEL (6 TMS)	COMBINED (6 TMS)
2.0	5.0	4.0	3.7
2.5	5.0	4.0	3.7
3.0	5.0	4.0	3.7
3.5	5.0	4.0	3.7
4.0	5.0	4.0	3.7
5.0	5.0	5.2	4.8
6.0	5.0	5.2	4.8
8.0	5.0	5.2	4.8

HIT 'RETURN' TO CONTINUE -

Figure 6.8

In every case the combined average is less than either the personnel average or the materiel average. That is because in the joint distribution of capability sometimes personnel was dominantly low and sometimes materiel was dominantly low.

For cases where materiel would be the lowest for each replication, the combined and material averages would be equal. Likewise, if personnel were consistently the lowest, the combined average would be equal to that of personnel.

Hitting "RETURN" restores the dynamic capability menu.

```
DYNAMIC CAPABILITY - SCREEN DISPLAYS

CORCAP - SCOUT PLATOON - PERSONNEL
CORCAP - SCOUT PLATOON - MATERIEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     TEAM CAP AS F(T)
 2     PERCENT CAP AS F(T)

 3     PSNL CAP W/CONF INT
 4     MAT CAP W/CONF INT
 5     COMB CAP W/CONF INT

 6     LINEPRINT
 7     OTHER OPTIONS

ENTER YOUR CHOICE - ?2
```

Figure 6.9

Entry 2 leads to displays similar in format to the foregoing and is reflected in Figures 6.10 and 6.11.

```
CORCAP - SCOUT PLATOON - PERSONNEL
CORCAP - SCOUT PLATOON - MATERIEL

CAPABILITY AS A FUNCTION OF TIME

   PERCENT OF FULL TEAMS

TIME    PERSONNEL   MATERIEL    COMBINED
        (6 TMS)     (6 TMS)     (6 TMS)

  0        47.2        47.2        38.9
 .1        55.6        58.3        44.4
 .2        69.4        58.3        50.0
 .3        80.6        58.3        55.6
 .4        80.6        66.7        61.1
 .5        80.6        66.7        61.1
 .6        80.6        66.7        61.1
 .7        83.3        66.7        61.1
 .8        83.3        66.7        61.1
 .9        83.3        66.7        61.1
1.0        83.3        66.7        61.1
1.2        83.3        66.7        61.1
1.4        83.3        66.7        61.1
1.6        83.3        66.7        61.1
1.8        83.3        66.7        61.1


HIT 'RETURN' TO CONTINUE -
```

Figure 6.10

```
CORCAP - SCOUT PLATOON - PERSONNEL
CORCAP - SCOUT PLATOON - MATERIEL

CAPABILITY AS A FUNCTION OF TIME

   PERCENT OF FULL TEAMS

TIME    PERSONNEL   MATERIEL    COMBINED
        (6 TMS)     (6 TMS)     (6 TMS)

 2.0       83.3        66.7        61.1
 2.5       83.3        66.7        61.1
 3.0       83.3        66.7        61.1
 3.5       83.3        66.7        61.1
 4.0       83.3        66.7        61.1
 5.0       83.3        86.1        80.6
 6.0       83.3        86.1        80.6
 8.0       83.3        86.1        80.6

HIT 'RETURN' TO CONTINUE -
```

Figure 6.11

This measure is a percentage of full capability. (In this case, six teams is full capability.) It is obtained by dividing average team capability by total teams and multiplying by 100.

We return to the dynamic menu to select Option 3.

```
DYNAMIC CAPABILITY - SCREEN DISPLAYS

CORCAP - SCOUT PLATOON - PERSONNEL
CORCAP - SCOUT PLATOON - MATERIEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     TEAM CAP AS F(T)
 2     PERCENT CAP AS F(T)

 3     PSNL CAP W/CONF INT
 4     MAT CAP W/CONF INT
 5     COMB CAP W/CONF INT

 6     LINEPRINT
 7     OTHER OPTIONS

ENTER YOUR CHOICE - ?3
```

Figure 6.12

Option 3 produces the successive displays of Figure 6.13 and 6.14.

CORCAP - SCOUT PLATOON - PERSONNEL
CORCAP - SCOUT PLATOON - MATERIEL

CAPABILITY AND CONFIDENCE
AS A FUNCTION OF TIME

PERSONNEL TEAMS AND PERSONNEL PERCENT

TIME (HRS)	TEAM CAP	TEAM CONF	PERCENT CAP	PERCENT CONF
0	2.8	1.1	47.2	18.2
.1	3.3	1.6	55.6	27.0
.2	4.2	1.4	69.4	23.6
.3	4.8	1.0	80.6	16.0
.4	4.8	1.0	80.6	16.0
.5	4.8	1.0	80.6	16.0
.6	4.8	1.0	80.6	16.0
.7	5.0	.7	83.3	12.3
.8	5.0	.7	83.3	12.3
.9	5.0	.7	83.3	12.3
1.0	5.0	.7	83.3	12.3
1.2	5.0	.7	83.3	12.3
1.4	5.0	.7	83.3	12.3
1.6	5.0	.7	83.3	12.3
1.8	5.0	.7	83.3	12.3

HIT 'RETURN' TO CONTINUE -

Figure 6.13

CORCAP - SCOUT PLATOON - PERSONNEL
CORCAP - SCOUT PLATOON - MATERIEL

CAPABILITY AND CONFIDENCE
AS A FUNCTION OF TIME

PERSONNEL TEAMS AND PERSONNEL PERCENT

TIME (HRS)	TEAM CAP	TEAM CONF	PERCENT CAP	PERCENT CONF
2.0	5.0	.7	83.3	12.3
2.5	5.0	.7	83.3	12.3
3.0	5.0	.7	83.3	12.3
3.5	5.0	.7	83.3	12.3
4.0	5.0	.7	83.3	12.3
5.0	5.0	.7	83.3	12.3
6.0	5.0	.7	83.3	12.3
8.0	5.0	.7	83.3	12.3

HIT 'RETURN' TO CONTINUE -

Figure 6.14

This display shows average team and average percent capability. An additional feature is added; a confidence interval.

The confidence interval is calculated to be the statistical range (+/-) within which 90% of the averages are expected to fall. The third column confidence interval is in terms of team units and the last column confidence interval is in terms of percentage units.

In the particular example, the confidence intervals are relatively large. This is because the results derive from only six replications. 20 to 30 replications will normally place the average within 5% of the true value with a 90% assurance.

The confidence interval calculations are automatic and are based on the t-distribution.

A "RETURN" entry will return the display to the Dynamic Capability Menu.

```
DYNAMIC CAPABILITY - SCREEN DISPLAYS

CORCAP - SCOUT PLATOON - PERSONNEL
CORCAP - SCOUT PLATOON - MATERIEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     TEAM CAP AS F(T)
 2     PERCENT CAP AS F(T)

 3     PSNL CAP W/CONF INT
 4     MAT CAP W/CONF INT
 5     COMB CAP W/CONF INT

 6     LINEPRINT
 7     OTHER OPTIONS

ENTER YOUR CHOICE - ?7
```

Figure 6.15

Options 4 and 5 are in the same format as Option 3 just discussed.

Option 6 permits hard copy printing of Options 1 through 5.

Option 7 returns the display to the main menu.

```
STATIC CAPABILITY - SCREEN DISPLAYS

CORCAP - SCOUT PLATOON - PERSONNEL
CORCAP - SCOUT PLATOON - MATERIEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     PROGRAM AND FILE OPTIONS
 2     LINEPRINT

 3     ZERO TIME CAPABILITY
 4     MINIMUM RECONSTITUTION CAPABILITY
 5     MAXIMUM CAPABILITY

 6     DYNAMIC CAPABILITY

 7     FILE AND DATA AUDIT

ENTER YOUR CHOICE - ?7
```

Figure 6.16

We had left this menu using Option 6 to explore dynamic capability. Only Option 7 remains to be examined.

```
FILE AND DATA AUDIT

CORCAP - SCOUT PLATOON - PERSONNEL
CORCAP - SCOUT PLATOON - MATERIEL

FILE/DATA       PERSONNEL    MATERIEL
 TYPE           FILE/DATA    FILE/DATA
---------       ---------    ---------
UNIT DATA       SCOUTP       SCOUTM
SURVIVORS       SAMSCOP6     SAMSCOM6
CAP DIST        CAPSCOP6     CAPSCOM6
TIME SAMPLE     EXPECTED     EXPECTED
TIME DIST       NOT SAVED    NOT SAVED
CAP AS F(T)     CFTSCOP6     CFTSCOM6

REPLICATIONS      6            6
TEAMS             6            6
TIME DATA PTS *   23           23

* 23 TIME DATA POINTS IN COMMON


HIT 'RETURN' TO CONTINUE -
```

Figure 6.17

This display (which may also be printed in hard copy) provides a useful summary of all data files used and record data items such as numbers of replications, teams and the number of common time data points.

The final item to explore is what happens when we enter two data files into this program which are incompatible.

The data files may be incompatible because the number of teams are different or the number of replications are different. If the number of teams are different, percent combined capability has no meaning. If the number of replications are different the minimum of personnel and materiel capability for each replication (to get combined capability) has no meaning. Yet there may be cases where the user would wish to compare results or get a confidence interval. Let us examine an example of incompatibility.

We restart the program by typing and entering "RUN."

```
C A P A B I L I T Y

C O O R D I N A T O R

M O D U L E

ENTER FIRST CAPABILITY-VS-TIME
 FILE NAME - CFTSCOP6

ENTER SECOND CAPABILITY-VS-TIME
 FILE NAME - CFTMECP6
BOTH FILES ENTERED WERE PERSONNEL DATA

TYPE 'RUN' TO ENTER PERSONNEL
 AND MATERIEL DATA

HIT 'RETURN' TO CONTINUE -
```

Figure 6.18 .

In the case of Figure 6.18 we entered two different personnel capability files (Scout Platoon and Mechanized Infantry Company). The program "sensed" that both were personnel data and aborted the program.

We again restarted by typing in "RUN."

```
C A P A B I L I T Y

C O O R D I N A T O R

M O D U L E

ENTER FIRST CAPABILITY-VS-TIME
 FILE NAME - CFTMECP6

ENTER SECOND CAPABILITY-VS-TIME
 FILE NAME - CFTSCOM6

READING CFTMECP6

READING CFTSCOM6

TEAM NUMBERS ARE INCOMPATIBLE

 WHILE COORDINATED CAPABILITIES CANNOT
  BE MEASURED, A COMPARISON BETWEEN
   PERSONNEL AND MATERIEL MAY BE MADE

HIT 'RETURN' TO CONTINUE -
```

Figure 6.19

One of the two files is personnel and the other materiel but they derive from different units.

The program "senses" a failure of the same number of teams and displays the message shown. The program will display personnel, and materiel capability but no combined capability. We may make a visual comparison but the program will not attempt to coordinate capabilities.

Only common time data points will be shown. Hitting "RETURN" continues averaging processing and leads to the main menu from which all options may be activated as for compatible cases. But no combined capability will be shown. We again show the "FILE AND DATA AUDIT" by selecting 7.

```
STATIC CAPABILITY - SCREEN DISPLAYS

CORCAP - MECH COMPANY - PERSONNEL
CORCAP - SCOUT PLATOON - MATERIEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     PROGRAM AND FILE OPTIONS
 2     LINEPRINT

 3     ZERO TIME CAPABILITY
 4     MINIMUM RECONSTITUTION CAPABILITY
 5     MAXIMUM CAPABILITY

 6     DYNAMIC CAPABILITY

 7     FILE AND DATA AUDIT

ENTER YOUR CHOICE - ?7
```

Figure 6.20

```
FILE AND DATA AUDIT

CORCAP - MECH COMPANY - PERSONNEL
CORCAP - SCOUT PLATOON - MATERIEL

FILE/DATA       PERSONNEL    MATERIEL
 TYPE           FILE/DATA    FILE/DATA
---------       ---------    ---------
UNIT DATA       MECHP        SCOUTM
SURVIVORS       NOT SAVED    SAMSCOM6
CAP DIST        CAPMECP6     CAPSCOM6
TIME SAMPLE     EXPECTED     EXPECTED
TIME DIST       TIMMECP6     NOT SAVED
CAP AS F(T)     CFTMECP6     CFTSCOM6

REPLICATIONS      6            6
TEAMS             18           6
TIME DATA PTS *   23           23

* 23 TIME DATA POINTS IN COMMON


HIT 'RETURN' TO CONTINUE -
```

Figure 6.21

CHAPTER 7
USER UTILITIES

7.0 OVERVIEW

This chapter will present several programs or additions to programs that help the user apply the AMORE methodology. These programs will enable him to accommodate to special situations, help him tailor input data or provide a basis for more detailed analysis of main program results.

All of the AMORE model system programs appear on one of two disk volumes. Additionally, there are two types of programs. First, there are those that stand alone and may be called from the "AMORE" program unique to each disk. They are stored as basic files. A second kind consists of those to be added to or merged with other programs using a command such as "EXEC REDIM" followed by "RUN." The latter are stored as text files.

The programs are summarized in Figure 7.1 together with a paragraph number where more complete information may be found.

ACTION	PURPOSE	PARAGRAPH
Austere Organizational Capability Simulation	Conserve Memory, Larger Units	7.1
Redimensioning Unit Data Files	Change Numbers of Teams or Line Items	7.2
Capability File Reader	Analysis of Survivors and Assignments by Replication	7.3
Extend Personnel Casualty Categories	Allow for Short and Mid-Term Return to Duty	7.4
Mission Essential Team Builder	Convert Functions, Frequencies and Times of Performance by Task into MET's	7.5

ACTION	PURPOSE	PARAGRAPH
Personnel Degrader	Transform Skill Productivity Losses into Untrained and Trained Team Performace Bounds	7.6
Survivor Linkage	Develops Survivor Files When Loss of One Item Impacts on the Loss of Others	7.7

Figure 7.1

7.1 AUSTERE ORGANIZATIONAL CAPABILITY SIMULATION

The Standard Organizational Capability Simulation (found on disk Volume 1) is limited as to the size of organization that can be accommodated before the APPLE II computer runs out of memory.

Generally the upper limit is sensitive to the number of line items, the number of teams, the number of replications, and whether the data file is personnel or materiel.

With the standard simulator about 30 line items of personnel skills, with 18 teams (mechanized infantry company) may be run for six replications.

18 or 19 materiel line items, with 18 teams may also be run for six replications.

One of the ways of conserving APPLE memory is by subdividing the program into smaller parts (thereby requiring less program to compete for the limited memory budget).

The programs are automatically chained together using APPLE software so that a new stage program is read and the old stage erased without zeroing any variable or array values.

AMORE model system disk Volume 2 contains chain versions of the Organizational Capability Simulator separately for personnel and materiel. Using these programs can extend the above cases to

35 personnel skills, 18 teams, 30 replications or
25 materiel items, 18 teams, 30 replications

Running the program requires that the data file be on disk 2.

The programs can be run in several ways. For personnel enter "RUN ORGCAP 1" with disk 2 in the running drive.

Alternatively start up with a disk 2 in drive 1 and go from the AMORE program.

Finally, enter "RUN AMORE" and follow the sequences below.

```
]RUN AMORE

W E L C O M E

T O   T H E

A M O R E

M O D E L   S Y S T E M

* * * VOLUME 2 * * *

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```

Figure 7.2

After a few moments, Figure 7.2 gives way to Figure 7.3.

```
R U N   O P T I O N S - V O L   2

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     ORG CAP PERSONNEL (CHAIN)
 2     ORG CAP MATERIEL (CHAIN)
 3     DATA FILE REDIMENSION
 4     FILE READER
 5     PERSONNEL DEGRADER
 6     MET BUILDER
 7     MET MERGER

 8     STOP

ENTER YOUR CHOICE - 1
```

Figure 7.3

The program choices shown are basic utility programs available on disk Volume 2. Together they satisfy five of the seven actions summarized in Figure 7.1 above.

We initialize the austere personnel run by entering 1.

While ORGCAP1 is being read in, the display shows Figure 7.2 again and then is replaced by Figure 7.4 which builds progressively.

```
JRUN ORGCAP1
     O R G A N I Z A T I O N A L

          C A P A B I L I T Y

           S I M U L A T O R

           P E R S O N N E L


ENTER DATA FILE NAME
 SCOUTP

READING IN SCOUT PLATOON - PERSONNEL
 DATA

HOW MANY REPLICATIONS - 6

DEGRADATION PROBABILITIES ARE
 NOW ALL .15

THERE ARE 6 TEAMS
 ENTER GOAL TEAM LEVEL - 5
```

Figure 7.4

In this case because of austerity, we only have one chance at specifying numbers of replications. This choice both sets dimensions and establishes the number of trials.

In the Austere version, the user must completely rerun the chain and preset probabilities in the Preprocessor for alternate cases.

In this case, we chose to enter a survivor file (results may be compared with those of Chapter 4).

```
IF YOU WISH TO CALL A SURVIVOR FILE,
 ENTER 'CAL' - CAL

ENTER SURVIVOR FILE NAME - SANSCOP6

READING IN SCOUT PLATOON - PERSONNEL
 SURVIVOR DATA
REPLICATION 1    TEAM 6
```

Figure 7.5

The sequence of team build is the same as shown in Chapter 4 and only the first and sixth replications will be shown here in Figures 7.6 and 7.7.

```
GOAL 5 TEAMS - DEG PROB ALL .15
1 REPLICATIONS OF 1 SUCCEEDED
LAST MAXIMUM PENALTY: 5

TEAMS BUILT
  1      0
  2      0
  3      0
  4      0
  5      0
  6      1


REPLICATION 2    TEAM 6
```

Figure 7.6

```
GOAL 5 TEAMS - DEG PROB ALL .15
4 REPLICATIONS OF 6 SUCCEEDED
LAST MAXIMUM PENALTY: 10

TEAMS BUILT
  1      0
  2      0
  3      0
  4      2
  5      2
  6      2
```

Figure 7.7

Figure 7.7 presents the same optimal summary as that in Chapter 4. Following this computational display the program automatically reads in the next program chain. Therefore, the disk (Vol II) must be kept in the drive. The display gives way to Figure 7.8, the first menu.

```
SOLUTION RESULT SCREEN PRINTS
 ORGCAP - SCOUT PLATOON - PERSONNEL
   SELECT FROM THE FOLLOWING OPTIONS
ENTER TO GET
  1     PROGRAM AND FILE OPTIONS
  2     LINEPRINT
  3     OPTIMAL SUMMARY
  4     ASSIGNMENT DATA
  5     EXPECTED ASSIGNMENT PENALTIES
  6     NEEDS AND SURPLUS CALCULATIONS
ENTER YOUR CHOICE - ?4
```

Figure 7.8

Note that we were not given the opportunity to save a capability file. We can do that by invoking the program and file options (which we shall do in a moment). Note also that there is no "solve" option. We must restart the program for alternate cases. At this point we confirm the solution by entering 4 to get the displays in Figures 7.9, 7.10, and 7.11.

```
ORGCAP - SCOUT PLATOON - PERSONNEL
 AVERAGE ASGMTS - UNUSED FEASIBILITY

   SKILL          1     2     3     4     5

01 PLT LDR       .8    F     -     -     -
02 PLT SGT       F     .3    F     -     -
03 GUNNER        -     F     1.3   F     F
04 SCOUT         -     -     F     1.2   F
05 SCOUT DVR     -     -     F     F     1.3
06 SECT LDR      .2    F     F     F     -
07 SQD LDR       F     F     F     F     -
08 GUNNER        -     F     F     .2    F
09 SCOUT         -     -     F     F     F
10 SCOUT DVR     -     -     F     F     F
11 SCOUT         -     -     F     F     F

HIT 'RETURN' TO CONTINUE -
```

Figure 7.9

```
ORGCAP - SCOUT PLATOON - PERSONNEL
 AVERAGE ASGMTS - UNUSED FEASIBILITY

   SKILL          6     7     8     9     10

01 PLT LDR       F     F     -     -     -
02 PLT SGT       F     .2    F     -     -
03 GUNNER        F     F     .2    F     F
04 SCOUT         F     F     F     F     .2
05 SCOUT DVR     -     -     F     F     F
06 SECT LDR      1.3   .2    F     F     F
07 SQD LDR       F     1.5   F     F     F
08 GUNNER        .3    .2    3.5   .2    F
09 SCOUT         F     F     F     3.5   F
10 SCOUT DVR     F     F     F     F     3.5
11 SCOUT         -     -     F     F     F

HIT 'RETURN' TO CONTINUE -
```

Figure 7.10

```
ORGCAP - SCOUT PLATOON - PERSONNEL
 AVERAGE ASGMTS - UNUSED FEASIBILITY

   SKILL       11

01 PLT LDR      -
02 PLT SGT      -
03 GUNNER       F
04 SCOUT        F
05 SCOUT DVR    .5
06 SECT LDR     -
07 SQD LDR      -
08 GUNNER       .3
09 SCOUT        F
10 SCOUT DVR    F
11 SCOUT       2.8

HIT 'RETURN' TO CONTINUE -
```

Figure 7.11

The user may wish to compare these with their counterparts in Chapter 4 to confirm that they are the same.

We hit "RETURN" to get back the menu at Figure 7.12.

```
SOLUTION RESULT SCREEN PRINTS

 ORGCAP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     PROGRAM AND FILE OPTIONS

 2     LINEPRINT

 3     OPTIMAL SUMMARY
 4     ASSIGNMENT DATA
 5     EXPECTED ASSIGNMENT PENALTIES

 6     NEEDS AND SURPLUS CALCULATIONS

ENTER YOUR CHOICE - ?1
```

Figure 7.12

A selection of Option 3 or 5 would also be exactly the same as formerly seen in Chapter 4.

We select 1 to examine program and file options.

```
P R O G R A M   O P E R A T I O N S

 ORGCAP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     CATALOG,D1
 2     CATALOG,D2

 3     UNLOCK, SAVE, LOCK ORGCAP2,D1
 4     UNLOCK, SAVE, LOCK ORGCAP2,D2

 5     RUN PREP
 6     RUN TIME CAP SIMULATOR

 7     SAVE SURVIVOR FILE
 8     SAVE CAPABILITY FILE

 9     STOP
10     OTHER OPTIONS

ENTER YOUR CHOICE - ?10
```

Figure 7.13

It is here that we have our last opportunity to save a survivor and/or capability file. We could have saved a survivor file if we had not entered one (i.e., created the survivor array). But there is only one opportunity for the capability file - if the user elects to save both he should save the survivor file first so the file name is saved on the capability file audit. We have already saved both files and so return to the first menu.

```
SOLUTION RESULT SCREEN PRINTS

 ORGCAP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     PROGRAM AND FILE OPTIONS

 2     LINEPRINT

 3     OPTIMAL SUMMARY
 4     ASSIGNMENT DATA
 5     EXPECTED ASSIGNMENT PENALTIES

 6     NEEDS AND SURPLUS CALCULATIONS

ENTER YOUR CHOICE - ?6
```

Figure 7.14

By selecting the needs and surplus calculation, we automatically call in the final link in the program chain and are prompted for the goal team level in Figure 7.15.

```
O R G A N I Z A T I O N A L

C A P A B I L I T Y

S I M U L A T O R

P E R S O N N E L

3


NEEDS AND SURPLUS CALCULATION

THERE ARE 6 TEAMS ENTER GOAL TEAM LEVEL
 5

REPL 1 SUPPLY EXCEEDS DEMAND BY 5
REPL 2 SUPPLY EXCEEDS DEMAND BY 4
REPL 3 SUPPLY EXCEEDS DEMAND BY 3
REPL 4 SUPPLY EXCEEDS DEMAND BY 1
REPL 5 DEMAND EXCEEDS SUPPLY BY 2
REPL 6 DEMAND EXCEEDS SUPPLY BY 3
```

Figure 7.15

Entry of 5 as the goal team leads to the progression of replication information and then to the same needs and surplusses we saw in Chapter 4 (Figure 7.16).

```
NEEDS AND SURPLUSSES
 ORGCAP - SCOUT PLATOON - PERSONNEL
GOAL 5 TEAMS AFTER 6 REPLICATIONS

                  NEEDS      SURPLUSSES

01 PLT LDR         .17          0
02 PLT SGT         0            .17
03 GUNNER          0            .5
04 SCOUT           0            0
05 SCOUT DVR       0            .33
06 SECT LDR        0            0
07 SQD LDR         .17          0
08 GUNNER          .33          1.17
09 SCOUT           .17          0
10 SCOUT DVR       0            0
11 SCOUT           0            0

HIT 'RETURN' TO CONTINUE -
```

Figure 7.16

Hitting "RETURN" leads to the final menu in Figure 7.17.

```
P R O G R A M   O P E R A T I O N S

 ORGCAP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     CATALOG,D1
 2     CATALOG,D2

 3     UNLOCK, SAVE, LOCK ORGCAP3,D1
 4     UNLOCK, SAVE, LOCK ORGCAP3,D2

 5     RUN PREP
 6     RUN TIME CAP SIMULATOR

 7     SCREENPRINT NEEDS AND SURPLUSSES
 8     LINEPRINT NEEDS AND SURPLUSSES

 9     STOP

ENTER YOUR CHOICE - ?9
```

Figure 7.17

Next we show the Austere version of the Organizational Capability Simulator for materiel. The materiel version is a stand alone program and is not derived by merging a text-file with the personnel version as in Disk 1.

Where the personnel version consisted of a chain of three links, the materiel version is a chain of six links. We can start this program in ways similar to the personnel version. Here we typed in "RUN ORGMAT1."

```
]RUN ORGMAT1
     O R G A N I Z A T I O N A L

          C A P A B I L I T Y

            S I M U L A T O R

              M A T E R I E L


ENTER DATA FILE NAME
 SCOUTM

READING IN SCOUT PLATOON - MATERIEL
 DATA

HOW MANY REPLICATIONS -
 (MAXIMUM FOR DIMENSIONING PURPOSES)?
 2
THERE ARE 6 TEAMS
 ENTER GOAL TEAM LEVEL - 5
```

Figure 7.18

Here we only use 2 replications for illustration purposes. The survivor file display appears at figure 7.19.

```
 IF YOU WISH TO CALL A SURVIVOR FILE,
  ENTER 'CAL' - CAL

 ENTER SURVIVOR FILE NAME - SAMSCOM6

 READING IN SCOUT PLATOON - MATERIEL
  SURVIVOR DATA

 REPLICATION 1    TEAM 6
```

Figure 7.19

The second program is "chained" in for the capability computations shown in Figures 7.20 and 7.21.

```
GOAL 5 TEAMS - DEG PROB ALL .05/.1/.2
1 REPLICATIONS OF 1 SUCCEEDED
LAST MAXIMUM PENALTY: 240

TEAMS BUILT
  1      0
  2      0
  3      0
  4      0
  5      0
  6      1


REPLICATION 2    TEAM 6
```

Figure 7.20

```
GOAL 5 TEAMS - DEG PROB ALL .05/.1/.2
2 REPLICATIONS OF 2 SUCCEEDED
LAST MAXIMUM PENALTY: 240

TEAMS BUILT
  1      0
  2      0
  3      0
  4      0
  5      0
  6      2
```

Figure 7.21

The third link is "chained" in to display the solutions.

```
SOLUTION RESULT SCREEN PRINTS

 ORGMAT - SCOUT PLATOON - MATERIEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     OPTIMAL SUMMARY
 2     ASSIGNMENT DATA
 3     EXPECTED ASSIGNMENT PENALTIES

 4     LINEPRINT

 5     RUN FILE SAVING STEP

ENTER YOUR CHOICE - ?5
```

Figure 7.22

The user can display options 1 through 3 or select 4 to lineprint them. But selection of 5 "chains" in the next link to save files or continue.

```
F I L E   S A V I N G

 ORGMAT - SCOUT PLATOON - MATERIEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SAVE SURVIVOR FILE
 2     SAVE CAPABILITY FILE

 3     RUN NEEDS AND SURPLUSSES

ENTER YOUR CHOICE - ?3
```

Figure 7.23

This is the last opportunity to save any files. Selection of 3 chains in the fifth increment for the needs and surplus computation.

```
NEEDS AND SURPLUS CALCULATION

THERE ARE 6 TEAMS ENTER GOAL TEAM LEVEL
 5

REPL 1 SUPPLY EXCEEDS DEMAND BY 3
REPL 2 SUPPLY EXCEEDS DEMAND BY 3
```

Figure 7.24

Entry of the goal team level (5) continues the progressive replication information and then automatically the final (sixth) link of the program is "chained" in to yield for final menu which is self explanatory.

```
P R O G R A M   O P E R A T I O N S

 ORGMAT - SCOUT PLATOON - MATERIEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SCREENPRINT NEEDS AND SURPLUSSES
 2     LINEPRINT NEEDS AND SURPLUSSES

 3     STOP

ENTER YOUR CHOICE - ?3
```

Figure 7.25

7.2 REDIMENSIONING UNIT DATA FILES

Preprocessing changes in organizations is convenient provided the user only needs to change a MET, initial strength, probabilities, substitutabilities, or reaction times. The user merely reads a data file into the preprocessor, makes the changes and then recreates or alternately creates a unit data file.

What is the user to do when he wishes to add, insert, delete either a line item or a team? In the Preprocessor, these factors have been fixed by dimensioning. Dimensioning is a necessary evil in the Apple computer in order to earmark memory for program arrays.

In order to more fully appreciate this problem, visualize an organization with five teams and all inputs entered. For some reason, the number of teams on the MET must be changed to six.

This kind of problem occurs often enough that to go back to the Preprocessor and start afresh is too much of a burden.

Accordingly, the redimensioning programs were developed. Their generic capability is to systematically enlarge or reduce line items or teams.

There are two versions and both have the same redimensioning capabilities. DIMEN is a stand alone basic program. REDIM merges with the current Preprocessor. DIMEN has no editing capabilities but can accommodate larger units. REDIM merged with PREP allows editing after redimensioning but is limited to 30 to 35 line items depending on the number of teams.

We shall start by running DIMEN, the stand alone basic program. It may be called from the AMORE program on Disk 2. In this example we invoke it by entering "RUN DIMEN" with disk 2 inserted. We get the first display:

```
JRUN DIMEN
                    A M O R E

                D A T A   F I L E

            R E D I M E N S I O N I N G

                    P R O G R A M


ENTER MAXIMUM NUMBER OF LINE ITEMS
 20

ENTER MAXIMUM NUMBER OF TEAMS
 18



ENTER DATA FILE NAME - SCOUTP

READING IN SCOUT PLATOON - PERSONNEL

TOTAL MET REQUIREMENT
 BEING COUNTED BY TEAM        __
```

Figure 7.26

We are prompted for upper limits for dimensioning. We only have to make sure that the dimensions of numbers of line items and teams is equal to or larger than either the data file to be read in or the objective size of the one to be built.

If we find we have not dimensioned high enough during use of this program, we can save the current state of the updated unit data in a data file; rerun the program setting higher dimensions and read the updated file in.

There are two dimensionings that occur in this program. The first sets the normal array dimensions (line items and teams). The second is variable and establishes how much of the first will be used. Obviously the first should be larger than the second.

Figure 7.26 builds progressively after the entry of SCOUTP and yields the display at Figure 7.27.

```
T E R M I N A L   O P T I O N S

 DIMEN - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SEE LINE ITEM TITLES
 2     SEE CUMULATIVE MET
 3     SEE INDIVIDUAL MET
 4     SEE SUBSTITUTABILITY
 5     SEE INIT STR, CDR'S REACT TIME
 6     SEE PROBABILITY DEGRADATION

 7     LINEPRINT OPTIONS
 8     FILE AND PROGRAM OPTIONS
 9     REDIMENSION

10     STOP

ENTER YOUR CHOICE - ?2
```

Figure 7.27

This program allows the user to print on the screen or by hardcopy all of the items available in the Preprocessor. But he cannot edit them. We show as an example the Cumulative MET in Figures 7.28 and 7.29. The user should note the totals for teams 2, 4 and 6 of 10, 19 and 28 respectively.

DIMEN - SCOUT PLATOON - PERSONNEL
CUMULATIVE MISSION ESSENTIAL TEAMS

	TM1	TM2	TM3	TM4	TM5
01 PLT LDR	0	0	0	1	1
02 PLT SGT	0	0	0	0	0
03 GUNNER	0	0	0	1	1
04 SCOUT	0	0	0	1	1
05 SCOUT DVR	0	0	0	1	1
06 SECT LDR	0	1	1	1	2
07 SQD LDR	1	1	2	2	2
08 GUNNER	1	2	3	3	4
09 SCOUT	1	2	3	3	4
10 SCOUT DVR	1	2	3	3	4
11 SCOUT	1	2	3	3	4
TOTAL	5	10	15	19	24

HIT 'ENTER' OR 'RETURN' TO CONTINUE -

Figure 7.28

DIMEN - SCOUT PLATOON - PERSONNEL
CUMULATIVE MISSION ESSENTIAL TEAMS

	TM6
01 PLT LDR	1
02 PLT SGT	1
03 GUNNER	2
04 SCOUT	2
05 SCOUT DVR	2
06 SECT LDR	2
07 SQD LDR	2
08 GUNNER	4
09 SCOUT	4
10 SCOUT DVR	4
11 SCOUT	4
TOTAL	28

HIT 'ENTER' OR 'RETURN' TO CONTINUE -

Figure 7.29

Next after return to the main menu (Figure 7.30), we select the Redimension Option and get Figure 7.31.

```
T E R M I N A L   O P T I O N S

 DIMEN - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SEE LINE ITEM TITLES
 2     SEE CUMULATIVE MET
 3     SEE INDIVIDUAL MET
 4     SEE SUBSTITUTABILITY
 5     SEE INIT STR, CDR'S REACT TIME
 6     SEE PROBABILITY DEGRADATION

 7     LINEPRINT OPTIONS
 8     FILE AND PROGRAM OPTIONS
 9     REDIMENSION

10     STOP

ENTER YOUR CHOICE - ?9
```

Figure 7.30

```
R E D I M E N S I O N   O P T I O N S

 DIMEN - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     ADD LINE ITEMS
 2     DELETE LINE ITEM
 3     INSERT LINE ITEM
 4     COMBINE LINE ITEMS

 5     ADD TEAMS
 6     DELETE TEAM
 7     INSERT TEAM
 8     COMBINE TEAMS

 9     OTHER OPTIONS

ENTER YOUR CHOICE - ?8
```

Figure 7.31

Notice all of the redimensioning options. First, we will reduce the number of teams from six to three. Accordingly we select Option 8.

```
COMBINE TWO TEAMS

ENTER 'R' IF YOU WISH TO RETURN

ENTER NUMBER OF TEAM
 TO REMAIN AND BE COMBINED WITH - 1

ENTER NUMBER OF SECOND TEAM
 TO COMBINE WITH FIRST TEAM
  AND THEN BE DELETED - 2

TOTAL MET REQUIREMENT
 BEING COUNTED BY TEAM
EDIT MET ?

EDIT INITIAL STRENGTH ?

HIT 'ENTER' OR 'RETURN' TO CONTINUE -
```

Figure 7.32

The foregoing figure displays the dialog to combine two teams. In this case, team 1 remains and team 2 is added to it and team 2 is deleted. Then teams 3,4,5 and 6 are automatically redesignated teams 2, 3, 4, and 5. Notice at the bottom of the display are some reminders that there may be a need for re-editing.

We made two additional combinings of teams.

- o New team 3 with New Team 2, then
- o Newest team 4 with Newest team 3

The net effects of these changes are to combine old teams 1 and 2 to new team 1, combine old teams 3 and 4 to new team 2, and combine old teams 5 and 6 to new team 3.

We went back to the main menu to lineprint the cumulative MET in its current form.

DIMEN - SCOUT PLATOON - PERSONNEL
CUMULATIVE MISSION ESSENTIAL TEAMS

	TM1	TM2	TM3
01 PLT LDR	0	1	1
02 PLT SGT	0	0	1
03 GUNNER	0	1	2
04 SCOUT	0	1	2
05 SCOUT DVR	0	1	2
06 SECT LDR	1	1	2
07 SQD LDR	1	2	2
08 GUNNER	2	3	4
09 SCOUT	2	3	4
10 SCOUT DVR	2	3	4
11 SCOUT	2	3	4
TOTAL	10	19	28

Figure 7.33

Notice that the cumulative totals of 10,19 and 28 correspond to the totals for original teams 2,4, and 6.

Next we again get to the redimensioning menu and select an option to combine two line items.

```
R E D I M E N S I O N   O P T I O N S

 DIMEN - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     ADD LINE ITEMS
 2     DELETE LINE ITEM
 3     INSERT LINE ITEM
 4     COMBINE LINE ITEMS

 5     ADD TEAMS
 6     DELETE TEAM
 7     INSERT TEAM
 8     COMBINE TEAMS

 9     OTHER OPTIONS

ENTER YOUR CHOICE - ?4
```

Figure 7.34

```
COMBINE TWO LINE ITEMS


ENTER 'R' IF YOU WISH TO RETURN


ENTER NUMBER OF LINE ITEM
 TO REMAIN AND BE COMBINED WITH - 3


ENTER NUMBER OF SECOND LINE
 TO COMBINE WITH FIRST LINE
  AND THEN BE DELETED - 8


TOTAL MET REQUIREMENT
 BEING COUNTED BY TEAM
SUBSTITUTIONS AND TRANSFERS
 NOW BEING COUNTED
EDIT INITIAL STRENGTH ?


HIT 'ENTER' OR 'RETURN' TO CONTINUE -
```

Figure 7.35

In this case we combined line item 8 (Gunner) with line item 3 (Gunner).

Notice that in this case substitutions and transfers were counted since the number of line items were changed.

We continued to apply this option to combine all Scouts and Scout Drivers in addition to all gunners. For MET requirements and initial strength, combining items are added to the combined-with item. Probabilities, substitutabilities and times are those of the combined-with item.

We went back through appropriate menus to lineprint the current Cumulative Mission Essential Team.

DIMEN - SCOUT PLATOON - PERSONNEL
CUMULATIVE MISSION ESSENTIAL TEAMS

	TM1	TM2	TM3
01 PLT LDR	0	1	1
02 PLT SGT	0	0	1
03 GUNNER	2	4	6
04 SCOUT	4	7	10
05 SCOUT DVR	2	4	6
06 SECT LDR	1	1	2
07 SQD LDR	1	2	2
TOTAL	10	19	28

Figure 7.36

Note again that totals have been preserved.

The current status of substitutability is shown in Figures 7.37 and 7.38.

DIMEN - SCOUT PLATOON - PERSONNEL
SUBSTITUTION MATRIX

SKILL	1	2	3	4	5
01 PLT LDR	0	0	-	-	-
02 PLT SGT	15	0	0	-	-
03 GUNNER	-	20	0	0	0
04 SCOUT	-	-	15	0	0
05 SCOUT DVR	-	-	30	15	0
06 SECT LDR	30	15	0	0	-
07 SQD LDR	30	15	0	0	-
SUBSTITUTES	3	4	5	4	2

Figure 7.37

DIMEN - SCOUT PLATOON - PERSONNEL
SUBSTITUTION MATRIX

SKILL	6	7	TRANS
01 PLT LDR	0	0	3
02 PLT SGT	0	0	4
03 GUNNER	15	15	5
04 SCOUT	30	30	4
05 SCOUT DVR	-	-	2
06 SECT LDR	0	0	5
07 SQD LDR	0	0	5
SUBSTITUTES	5	5	28

Figure 7.38

Finally we go to the File and Program Options.

```
T E R M I N A L   O P T I O N S

 DIMEN - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     CATALOG,D1
 2     CATALOG,D2

 3     UNLOCK, SAVE, LOCK DIMEN,D1
 4     UNLOCK, SAVE, LOCK DIMEN,D2

 5     RUN PREPROCESSOR
 6     RUN ORG CAP SIMULATOR
 7     RUN TIM CAP SIMULATOR

 8     SAVE DATA FILE

 9     OTHER OPTIONS

ENTER YOUR CHOICE - ?8
```

Figure 7.39

We next create a data file with the newest dimensions and accordingly enter option 8.

```
 DIMEN - SCOUT PLATOON - PERSONNEL

 ENTER DATA FILE NAME - SCOUTPSMALL

 IF YOU WISH TO DELETE A FILE
  WITH THE SAME NAME, ENTER 'D' -


 IF YOU ALSO WISH TO CREATE THE FILE,
  ENTER 'C' - C

 CREATING SCOUTPSMALL,D1

 IF YOU WISH TO BACKUP,
  ENTER 'B' -
```

Figure 7.40

We have called the new data file SCOUTPSMALL. (SCOUPT still exists.)

We next illustrate the alternate form of redimensioning. We invoke this by successively typing in "LOAD PREP" and "EXEC REDIM."

```
 LOAD PREP
]EXEC REDIM
]

]

]

]

]

]
```

Figure 7.41

The first command loads the Preprocessor into computer memory. We must have a disk with the PREP program on it inserted in the running drive followed by a disk with the REDIM text file.

The first command loads the Preprocessor into computer memory. The second modifies the Preprocessor program to add the redimensioning capability. The brackets appear until REDIM is fully merged with PREP. When they stop we type in RUN.

```
]RUN
                    A M O R E

                D A T A   F I L E

            R E D I M E N S I O N I N G

                P R O G R A M


ENTER MAXIMUM NUMBER OF LINE ITEMS
 20

ENTER MAXIMUM NUMBER OF TEAMS
 18


ENTER DATA FILE NAME - SCOUTPSMALL

READING IN SCOUT PLATOON - PERSONNEL

TOTAL MET REQUIREMENT
 BEING COUNTED BY TEAM
```

Figure 7.42

The initial printout of the program appears exactly like the DIMEN program. We have entered the file just created in the DIMEN program. Figure 7.42 gives way to the display in 7.43.

```
T E R M I N A L   O P T I O N S

 REDIM - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SEE LINE ITEM TITLES
 2     SEE CUMULATIVE MET
 3     SEE INDIVIDUAL MET
 4     SEE SUBSTITUTABILITY
 5     SEE INIT STR, CDR'S REACT TIME
 6     SEE PROBABILITY DEGRADATION

 7     EDIT OPTIONS
 8     LINEPRINT OPTIONS
 9     FILE AND PROGRAM OPTIONS
10     REDIMENSION

11     STOP

ENTER YOUR CHOICE - ?8
```

Figure 7.43

This looks exactly like the DIMEN menu except for the Edit Options entry.

We go to the lineprint option and display the Cumulative MET.

```
      REDIM - SCOUT PLATOON - PERSONNEL
  CUMULATIVE MISSION ESSENTIAL TEAMS

                    TM1   TM2   TM3

01 PLT LDR           0     1     1
02 PLT SGT           0     0     1
03 GUNNER            2     4     6
04 SCOUT             4     7    10
05 SCOUT DVR         2     4     6
06 SECT LDR          1     1     2
07 SQD LDR           1     2     2

TOTAL               10    19    28
```

Figure 7.44

The user can compare this display with that in Figure 7.36 to observe that they are the same. Redimensioning automatically sets up the proper format. This new file "SCOUTPSMALL" could be run through the Organizational Capability Simulator.

If we return to the main menu and select Redimensioning (Option 10)

```
T E R M I N A L   O P T I O N S

 REDIM - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SEE LINE ITEM TITLES
 2     SEE CUMULATIVE MET
 3     SEE INDIVIDUAL MET
 4     SEE SUBSTITUTABILITY
 5     SEE INIT STR, CDR'S REACT TIME
 6     SEE PROBABILITY DEGRADATION

 7     EDIT OPTIONS
 8     LINEPRINT OPTIONS
 9     FILE AND PROGRAM OPTIONS
10     REDIMENSION

11     STOP

ENTER YOUR CHOICE - ?10
```

Figure 7.45

we get

```
R E D I M E N S I O N   O P T I O N S

 REDIM - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     ADD LINE ITEMS
 2     DELETE LINE ITEM
 3     INSERT LINE ITEM
 4     COMBINE LINE ITEMS

 5     ADD TEAMS
 6     DELETE TEAM
 7     INSERT TEAM
 8     COMBINE TEAMS

 9     OTHER OPTIONS

ENTER YOUR CHOICE - ?3
```

Figure 7.46

We will enter 3 to insert a line item.

```
INSERT A LINE ITEM

ENTER 'R' IF YOU WISH TO RETURN

ENTER NUMBER OF LINE TO BE INSERTED
 - 5

TOTAL MET REQUIREMENT
 BEING COUNTED BY TEAM
SUBSTITUTIONS AND TRANSFERS
 NOW BEING COUNTED
EDIT LINE ITEM TITLES ?

EDIT SUBSTITUTABILITY ?

EDIT REACTION TIMES ?

EDIT PROBABILITIES ?

EDIT MET ?

EDIT INITIAL STRENGTH ?

HIT 'ENTER' OR 'RETURN' TO CONTINUE -
```

Figure 7.47

This display is the progressive dialog to insert a new line item 5. Several reminders appear with regard to editing requirements. We are returned to the main menu and again select 10, Redimension.

```
T E R M I N A L   O P T I O N S

 REDIM - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SEE LINE ITEM TITLES
 2     SEE CUMULATIVE MET
 3     SEE INDIVIDUAL MET
 4     SEE SUBSTITUTABILITY
 5     SEE INIT STR, CDR'S REACT TIME
 6     SEE PROBABILITY DEGRADATION

 7     EDIT OPTIONS
 8     LINEPRINT OPTIONS
 9     FILE AND PROGRAM OPTIONS
10     REDIMENSION

11     STOP

ENTER YOUR CHOICE - ?10
```

Figure 7.48

```
R E D I M E N S I O N   O P T I O N S

 REDIM - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     ADD LINE ITEMS
 2     DELETE LINE ITEM
 3     INSERT LINE ITEM
 4     COMBINE LINE ITEMS

 5     ADD TEAMS
 6     DELETE TEAM
 7     INSERT TEAM
 8     COMBINE TEAMS

 9     OTHER OPTIONS

ENTER YOUR CHOICE - ?7
```

Figure 7.49

This time we enter 7 to insert a new team 2. Figure 7.50 displays the team insertion dialog.

```
INSERT A TEAM

ENTER 'R' IF YOU WISH TO RETURN

ENTER NUMBER OF TEAM TO BE INSERTED
 - 2

TOTAL MET REQUIREMENT
 BEING COUNTED BY TEAM
EDIT MET ?

EDIT INITIAL STRENGTH ?

HIT 'ENTER' OR 'RETURN' TO CONTINUE -
```

Figure 7.50

We next lineprint the latest cumulative MET in Figure 7.51 and substitutability in Figures 7.52 and 7.53.

REDIM - SCOUT PLATOON - PERSONNEL
CUMULATIVE MISSION ESSENTIAL TEAMS

	TM1	TM2	TM3	TM4
01 PLT LDR	0	0	1	1
02 PLT SGT	0	0	0	1
03 GUNNER	2	2	4	6
04 SCOUT	4	4	7	10
05 ----------	0	0	0	0
06 SCOUT DVR	2	2	4	6
07 SECT LDR	1	1	1	2
08 SQD LDR	1	1	2	2
TOTAL	10	10	19	28

Figure 7.51

REDIM - SCOUT PLATOON - PERSONNEL
SUBSTITUTION MATRIX

SKILL	1	2	3	4	5
01 PLT LDR	0	0	-	-	-
02 PLT SGT	15	0	0	-	-
03 GUNNER	-	20	0	0	-
04 SCOUT	-	-	15	0	-
05 ----------	-	-	-	-	0
06 SCOUT DVR	-	-	30	15	-
07 SECT LDR	30	15	0	0	-
08 SQD LDR	30	15	0	0	-
SUBSTITUTES	3	4	5	4	0

Figure 7.52

REDIM - SCOUT PLATOON - PERSONNEL
SUBSTITUTION MATRIX

SKILL	6	7	8	TRANS
01 PLT LDR	-	0	0	3
02 PLT SGT	-	0	0	4
03 GUNNER	0	15	15	5
04 SCOUT	0	30	30	4
05 ----------	-	-	-	0
06 SCOUT DVR	0	-	-	2
07 SECT LDR	-	0	0	5
08 SQD LDR	-	0	0	5
SUBSTITUTES	2	5	5	28

Figure 7.53

The line item does not yet have a label, MET requriement or substitutability.

In Figure 7.50 the new team 2 has no entries and therefore appears cumulatively like team 1.

We must edit these new changes and then create a new data file.

7.3 CAPABILITY FILE READER

This is a basic program which may be initiated from the AMORE program on disk 2. Its title is FIREAD. To be operational, it requires a disk in the running drive with the following files:

- o the unit data file
- o An associated capability file (saved from the Organizational Capability Simulator), and
- o An associated Survivor File (if the Survivor file was saved prior to the capability file)

The capability file reader permits the following displays in either screen or lineprint form.

- o Reconstructed Average Assignment Data
- o Reconstructed Expected Penalties
- o Individual examination of survivors for any six replications at a time (Provided a survivor file was saved prior to saving the capability file)
- o Actual assignments for any selected replication with separated displays for those line items substituted and those line items assigned to their own slot.

We activate the program by typing in "RUN FIREAD" with a disk 2 in the running drive.

```
]RUN FIREAD
        C A P A B I L I T Y

              F I L E

            R E A D E R


ENTER CAPABILITY FILE NAME
 CAPSCOP6

THE SCOUTP CAPABILITY FILE
 IS NOW BEING READ IN
  FOR A 6 REPLICATION AMORE CASE

READING IN INPUT DATA FOR

FIREAD - SCOUT PLATOON - PERSONNEL

READING ASSIGNMENT PATTERNS OF THE
 CAPSCOP6 CAPABILITY FILE - BASED ON
  THE SCOUTP DATA FILE

READING IN SCOUT PLATOON - PERSONNEL
 SURVIVOR DATA

CALCULATING ASSIGNMENT VALUES
```

Figure 7.54

We answered the capability file name prompt with "CAPSCOP6." The remaining display in Figure 7.54 was progressively built as the "SCOUTP", "CAPSCOP6", and 'SAMSCOP6" files were read. Thereafter the first menu appears.

```
ASSIGNMENT DATA SCREENPRINTS

 FIREAD - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     PROGRAM AND FILE OPTIONS
 2     LINEPRINT

 3     AVERAGE ASSIGNMENT DATA
 4     EXPECTED PENALTIES
 5     SURVIVORS BY REPLICATION
 6     CALCULATE ASGMTS BY REPLICATION

 7     STOP

ENTER YOUR CHOICE - ?3
```

Figure 7.55

We first select Option 3 to get Figures 7.56, 7.57, and 7.58.

```
FIREAD - SCOUT PLATOON - PERSONNEL
 AVERAGE ASGMTS - UNUSED FEASIBILITY

    SKILL          1     2     3     4     5

01 PLT LDR        .8    F     -     -     -
02 PLT SGT        F     .3    F     -     -
03 GUNNER         -     F     1.3   F     F
04 SCOUT          -     -     F     1.2   F
05 SCOUT DVR      -     -     F     F     1.3
06 SECT LDR       .2    F     F     F     -
07 SQD LDR        F     F     F     F     -
08 GUNNER         -     F     F     .2    F
09 SCOUT          -     -     F     F     F
10 SCOUT DVR      -     -     F     F     F
11 SCOUT          -     -     F     F     F


HIT 'RETURN' TO CONTINUE -
```

Figure 7.56

```
FIREAD - SCOUT PLATOON - PERSONNEL
 AVERAGE ASGMTS - UNUSED FEASIBILITY

   SKILL          6     7     8     9    10

01 PLT LDR        F     F     -     -     -
02 PLT SGT        F    .2     F     -     -
03 GUNNER         F     F    .2     F     F
04 SCOUT          F     F     F     F    .2
05 SCOUT DVR      -     -     F     F     F
06 SECT LDR     1.3    .2     F     F     F
07 SQD LDR        F   1.5     F     F     F
08 GUNNER        .3    .2   3.5    .2     F
09 SCOUT          F     F     F   3.5     F
10 SCOUT DVR      F     F     F     F   3.5
11 SCOUT          -     -     F     F     F


HIT 'RETURN' TO CONTINUE -
FIREAD - SCOUT PLATOON - PERSONNEL
```

Figure 7.57

```
 AVERAGE ASGMTS - UNUSED FEASIBILITY

   SKILL         11

01 PLT LDR        -
02 PLT SGT        -
03 GUNNER         F
04 SCOUT          F
05 SCOUT DVR     .5
06 SECT LDR       -
07 SQD LDR        -
08 GUNNER        .3
09 SCOUT          F
10 SCOUT DVR      F
11 SCOUT        2.8


HIT 'RETURN' TO CONTINUE -_
```

Figure 7.58

Should the user wish to compare these displays with average assignment data calculated in Chapter 4, he will find them the same.

Numerical average assignments (from the row to the column) represent total assignments averaged over the replications; i.e., the expected number of assignments per replication. The "F"'s represent feasible substitutability which was not used.

Hitting "RETURN" re-establishes the main menu.

```
ASSIGNMENT DATA SCREENPRINTS

 FIREAD - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     PROGRAM AND FILE OPTIONS
 2     LINEPRINT

 3     AVERAGE ASSIGNMENT DATA
 4     EXPECTED PENALTIES
 5     SURVIVORS BY REPLICATION
 6     CALCULATE ASGMTS BY REPLICATION

 7     STOP

ENTER YOUR CHOICE - ?5
```

Figure 7.59

The Expected Penalties Option (4) yields the same display as its counterpart in Chapter 4 from the Organizational Capability Simulator. We pass to the fifth Option, a way of looking at a survivor file. First and foremost, we must have saved the proper survivor file prior to saving the Capability file after the solution in the Organizational Capability Simulator.

By selecting 5 we get Figure 7.60.

```
SURVIVORS BY SELECTED REPLICATION

YOU MAY SELECT UP TO 6
 DIFFERENT REPLICATIONS TO DISPLAY

ENTER THE NUMBER OF REPLICATIONS
 A ZERO WILL LEAD TO A DEFAULT SET
  0
```

Figure 7.60

If we enter a zero we will always get the first six or less replications. Any other number (1 to 6) will tell the program how many replications to display. Then we would be prompted to enter which ones (replication numbers). These can be entered in any order.

The user may have identified (back in the Time Capability Simulator) 3 replications which recovered way below expected capability. The displays in the Time Program can identify teams achieved by replications. The user could use this program to display (or lineprint) the survivors of these specified replications.

In the example the survivor file "SAMSCOP6" only saved six replications of survivors. We entered a zero to look at all of them. Up to six survivor sets will be displayed with line items labeled and replication numbers given.

```
SELECTED SURVIVORS

REPLICATION      1    2    3    4    5    6

01 PLT LDR       1    1    1    1         1
02 PLT SGT       1    1    1              1
03 GUNNER        2    2    1    2    2    2
04 SCOUT         1    2    1    1    2    2
05 SCOUT DVR     2    2    2    2    1    2
06 SECT LDR      2    1    2    2    1    2
07 SQD LDR       2    2    1    2    1    1
08 GUNNER        7    6    7    5    7    2
09 SCOUT         3    4    4    4    3    3
10 SCOUT DVR     4    4    4    4    2    3
11 SCOUT         4    3    3    2    3    2

TOTAL           29   28   27   25   22   21

HIT 'RETURN' TO CONTINUE -
```

Figure 7.61

"RETURN" restores the main menu.

```
 ASSIGNMENT DATA SCREENPRINTS

  FIREAD - SCOUT PLATOON - PERSONNEL

    SELECT FROM THE FOLLOWING OPTIONS

 ENTER TO GET

  1     PROGRAM AND FILE OPTIONS
  2     LINEPRINT

  3     AVERAGE ASSIGNMENT DATA
  4     EXPECTED PENALTIES
  5     SURVIVORS BY REPLICATION
  6     CALCULATE ASGMTS BY REPLICATION

  7     STOP

 ENTER YOUR CHOICE - ?5
```

Figure 7.62

We selected Option 5 again to look at a specific subset of survivors.

```
SURVIVORS BY SELECTED REPLICATION

YOU MAY SELECT UP TO 6
 DIFFERENT REPLICATIONS TO DISPLAY

ENTER THE NUMBER OF REPLICATIONS
 A ZERO WILL LEAD TO A DEFAULT SET
  4

FOR COLUMN 1

 ENTER REPLICATION NUMBER - 5

FOR COLUMN 2

 ENTER REPLICATION NUMBER - 6

FOR COLUMN 3

 ENTER REPLICATION NUMBER - 1

FOR COLUMN 4

 ENTER REPLICATION NUMBER - 3
```

Figure 7.63

We wished to examine survivors for replications 5,6,1, and 3 in that order. Accordingly 4 was entered (as the total number to be displayed) and subsequently the numbers 5, 6, 1, and 3 were entered as selections.

```
SELECTED SURVIVORS

REPLICATION     5    6    1    3

01 PLT LDR           1    1    1
02 PLT SGT           1    1    1
03 GUNNER       2    2    2    1
04 SCOUT        2    2    1    1
05 SCOUT DVR    1    2    2    2
06 SECT LDR     1    2    2    2
07 SQD LDR      1    1    2    1
08 GUNNER       7    2    7    7
09 SCOUT        3    3    3    4
10 SCOUT DVR    2    3    4    4
11 SCOUT        3    2    4    3

TOTAL           22   21   29   27

HIT 'RETURN' TO CONTINUE -
```

Figure 7.64

The user can compare these results with Figure 7.61 to verify that any order may be selected. We return to the main menu.

```
ASSIGNMENT DATA SCREENPRINTS

 FIREAD - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     PROGRAM AND FILE OPTIONS
 2     LINEPRINT

 3     AVERAGE ASSIGNMENT DATA
 4     EXPECTED PENALTIES
 5     SURVIVORS BY REPLICATION
 6     CALCULATE ASGMTS BY REPLICATION

 7     STOP

ENTER YOUR CHOICE - ?6
```

Figure 7.65

We select Option 6 to look at a specific assignment solution.

```
CALCULATING ASSIGNMENT VALUES
 BY REPLICATION

ENTER REPLICATION OF INTEREST - 4
```

Figure 7.66

We are first prompted for the replication number. We entered 4.

```
ASSIGNMENT DATA SCREENPRINTS

 FIREAD - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     PROGRAM AND FILE OPTIONS
 2     LINEPRINT

 3     AVERAGE ASSIGNMENT DATA
 4     EXPECTED PENALTIES
 5     SURVIVORS BY REPLICATION
 6     CALCULATE ASGMTS BY REPLICATION

 7     STOP

 8     ASSIGNMENTS BY REPLICATION

ENTER YOUR CHOICE - ?8
```

Figure 7.67

We were returned to the main menu and note there appears a new option (8). Selecting option 8 reveals the display in Figure 7.68.

```
SCOUT PLATOON - PERSONNEL

IN REPLICATION 4, 5 TEAMS WERE BUILT

CROSS ASSIGNMENTS OR REPAIRS

FROM            TO              NUMBER COST

05 SCOUT DVR    11 SCOUT             1      2
08 GUNNER       11 SCOUT             1      5

HIT 'RETURN' TO CONTINUE -
```

Figure 7.68

This portion reflects the replication number, the number of teams achieved, and all substitution assignments. In these assignments are shown the origin, destination, number and cost. [The cost is a combination of commander's reaction time, substitution penalty and (in the use of materiel) repair times.] "RETURN" continues the display.

```
SCOUT PLATOON - PERSONNEL

IN REPLICATION 4, 5 TEAMS WERE BUILT

ASSIGNED TO OWN LINE ITEM

FROM            NUMBER

01 PLT LDR          1
03 GUNNER           1
04 SCOUT            1
05 SCOUT DVR        1
06 SECT LDR         2
07 SQD LDR          2
08 GUNNER           4
09 SCOUT            4
10 SCOUT DVR        4
11 SCOUT            2

HIT 'RETURN' TO CONTINUE -
```

Figure 7.69

This shows all line items assigned to themselves. We show the same sequence for replication 5 in Figures 7.70 and 7.71.

```
SCOUT PLATOON - PERSONNEL

IN REPLICATION 5, 4 TEAMS WERE BUILT

CROSS ASSIGNMENTS OR REPAIRS

FROM            TO              NUMBER COST

04 SCOUT        10 SCOUT DVR         1    2
06 SECT LDR     01 PLT LDR           1   40
08 GUNNER       06 SECT LDR          1   20
08 GUNNER       07 SQD LDR           1   20

HIT 'RETURN' TO CONTINUE -
```

Figure 7.70

```
SCOUT PLATOON - PERSONNEL

IN REPLICATION 5, 4 TEAMS WERE BUILT

ASSIGNED TO OWN LINE ITEM

FROM            NUMBER

03 GUNNER            1
04 SCOUT             1
05 SCOUT DVR         1
07 SQD LDR           1
08 GUNNER            3
09 SCOUT             3
10 SCOUT DVR         2
11 SCOUT             3

HIT 'RETURN' TO CONTINUE -
```

Figure 7.71

The selection of Option 8 in the main menu will return the foregoing two displays. Option 6 must be selected to change the replication and accordingly the assignment displays.

The displays will be different by replication but may help the user to analyze identified special cases.

7.4 EXTEND PERSONNEL CASUALTY CATEGORIES

A materiel survivor array or file has three categories of survivors: undamaged, lightly damaged, and moderately damaged. The lightly and moderately damaged items usually have repair times associated with each line item. The same concept may be easily extended to personnel. Light and moderate casualties with expected times for return to duty may be useful for some AMORE analyses.

One simple way to do this is to setup the unit data file with the materiel option. There are three drawbacks to this approach. One, readins of the data file will bear the materiel label. Two, an existing personnel file cannot be converted easily. Three, capability coordinated with materiel cannot be obtained in the Coordinated Capability Module (it will abort because of sensing two "materiel" files).

A very simple way has been developed to extend personnel survivor categories without the above drawbacks. The user loads the Preprocessor and then merges a small program with it by typing in "EXEC PREPCONVERT."

```
LOAD PREP

EXEC PREPCONVERT
```

Figure 7.72

Disk 1 should be in the running drive for the first command. Disk 2 should be in the running drive for the second. A few brackets appear reflecting the merging of the new program.

The user may now type "RUN", he will have two options: enter a file, or create a file from scratch. We chose the former.

```
]RUN
                    A M O R E

              P R E P R O C E S S O R


IF YOU WISH TO READ IN A DATA FILE,
 ENTER THE WORD
   'F' 'I' 'L' 'E' - FILE


ENTER DATA FILE NAME - SCOUTP
READING IN SCOUT PLATOON - PERSONNEL
TOTAL MET REQUIREMENT
 BEING COUNTED BY TEAM
```

Figure 7.73

The SCOUTP (Scout Platoon - Personnel) file was entered. After reading the main menu appears.

```
T E R M I N A L   O P T I O N S

 PREP - SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SEE LINE ITEM TITLES
 2     SEE CUMULATIVE MET
 3     SEE INDIVIDUAL MET
 4     SEE SUBSTITUTABILITY
 5     SEE INIT STR, CDR'S REACT TIME
 6     SEE PROB DEG, REP TIMES

 7     EDIT OPTIONS
 8     LINEPRINT OPTIONS
 9     FILE AND PROGRAM OPTIONS

10     STOP

ENTER YOUR CHOICE - ?6
```

Figure 7.74

Without the prior merger of PREPCONVERT, the SCOUTP file would be treated as a personnel file and only a personnel file format could be saved. Notice, however, in the menu that option six shows repair times. We select 6 and get the next two displays.

```
PREP - SCOUT PLATOON - PERSONNEL
ALL .15 PROBABILITIES

ITEM              SEV     MOD     LIGHT

01 PLT LDR       .15      0       0
02 PLT SGT       .15      0       0
03 GUNNER        .15      0       0
04 SCOUT         .15      0       0
05 SCOUT DVR     .15      0       0
06 SECT LDR      .15      0       0
07 SQD LDR       .15      0       0
08 GUNNER        .15      0       0
09 SCOUT         .15      0       0
10 SCOUT DVR     .15      0       0
11 SCOUT         .15      0       0

HIT 'ENTER' OR 'RETURN' TO CONTINUE -
```

Figure 7.75

```
PREP - SCOUT PLATOON - PERSONNEL
 REPAIR TIMES

ITEM              MODERATE   LIGHT

01 PLT LDR            0         0
02 PLT SGT            0         0
03 GUNNER             0         0
04 SCOUT              0         0
05 SCOUT DVR          0         0
06 SECT LDR           0         0
07 SQD LDR            0         0
08 GUNNER             0         0
09 SCOUT              0         0
10 SCOUT DVR          0         0
11 SCOUT              0         0

HIT 'ENTER' OR 'RETURN' TO CONTINUE -
```

Figure 7.76

We have now created the need to edit in moderate and light probabilities and moderate and light repair (return to duty) times. A data file created by this Preprocessor will be in the materiel file format.

If the user runs this version of the Preprocessor, bypasses the file read-in alternative, and selects the personnel option, he will retain the personnel label but be in a materiel format.

Any merging of programs such as this one only affects the program in computer memory. Any future loading of "PREP" will load the original version and the user must "EXEC PREPCONVERT" to re-establish this mode.

Files created in this version of the Preprocessor will be sensed and will run as material file formats in the Organizational Capability Simulator. In order to coordinate materiel and personnel capability later, the user has to implement another merger of programs prior to running the Time Capability Simulator.

```
LOAD TIMCAP,D2

EXEC TIMCAPCONVERT,D1
```

Figure 7.77

The above shows an example with a two-disk drive operation where disk 2 is in drive 1 and disk 1 is in drive 2. This will successfully load and merge to get a revised Time Capability Simulator. The revised simulator will assure that any capability-as-a-function-of-time (CFT) file saved will have a proper format.

I.e., if an extended personnel survivor capability file is entered (it will be in materiel format), a saved CFT file based on this will be in the personnel format and may accordingly be coordinated with a corresponding materiel file.

7.5 MISSION ESSENTIAL TEAM BUILDER

Transforming mission requirements into Mission Essential Team requirements is perhaps one of the more challenging techniques to be learned by and AMORE apprentice user. This paragraph and its associated user utility is designed to lessen difficulties associated with developing mission essential teams (METs).

The concept presented here is to begin by breaking a mission down into its functional components or perhaps even down to the task level. It is conceivable that a two-stage tasks-to-function followed by functions-to-mission process could also be used with this associated software.

The advantage of having built a team with this process is that it permits identifying levels of resources where the threshold of function performance is reached. This enables more quantitative user analysis of

partial capabilities. As an example, the user could identify the minimum team level where some portion of all unit functions are enabled. Degradation to resources required to enable these threshold levels will be cutting into basic unit integrity. Analytically, this correlates with traditional perceptions of experienced military command and staff officers.

The quantitative underpinnings of the method lend themselves to reception of data developed from O and O concepts or from such models as the crew model developed and used by the ARI field office formerly at Fort Sill, Oklahoma and now residing at Fort Bliss, Texas with a liaison element remaining at Fort Sill.

The functional or task approach assumes the user is willing to stratify the unit mission into sub-ordinate and perhaps comingled functions or tasks. From the O and O concept, or from a design-to scenario, it is assumed that the user cannot only specify functions to be performed, but also their expected frequency of occurrance in a typical mission day.

It is also assumed that the user can specify expected work load demands on each participating skill (in terms of committment time) when the function or task is performed.

Finally it is assumed that the user can specify how much time is usable when each skill is present for duty in the unit.

Let us call f_i the mission day frequency of the task i; R_{ji} the man-hours required of skill j when performing function i, and A_j the mission man-hours available when skill j is present for duty for a mission day. The calculation of how many of skill j (S_j) to assign to the MET for a mission day for function i resembles that for MACRIT (or Manpower Authorization Criteria)

$$S_j = \frac{f_i \times R_{ji}}{A_j}$$

There are some refinements to this which will be covered as we proceed through the examples.

We take as an example a mortar platoon which, during its mission day performs or assumes performance of six major functions:

- o Supervise (SUP)
- o Reconnaissance (RCN)
- o March Order (M/O)
- o Move (MVE)
- o Emplace (EMP)
- o Fire Missions (F/M)

These functions are mapped out in Figure 7.78.

METBLD - MORTAR PLATOON - PERSONNEL

FUNCTION	SUP	RCN	M/O	MVE	EMP	F/M
FREQUENCY	4X	4X	4X	4X	4X	180X
TIME UNITS	HR	HR	MIN	HR	MIN	MIN
1 PLAT LDR	1	.5		1		
1 PLAT SGT		.5		2		
1 HQ RTO						
1 PLT LD DVR		.5		1		
1 PLT SG DVR		.5		1		
1 FDC SC LDR		.5		2		
1 FD COMPTR	1	.5				.5
1 FD COMPTR						1
1 FDC RTO						1
6 SQUAD LDR	1	.5	5		5	.5
6 GUNNER			5		5	2
6 AST GUNNER			5		5	2
6 AMM BEARER			15		30	.5
6 HMMWV DVR				2		

Figure 7.78

It is assumed that the platoon moves four times daily and thus goes four times through a cycle of reconnaissance, march order, movement and emplacement. We have further assumed that Supervision is essentially driven by the above four cycles. This is not a requirement.

Finally, it is assumed that the unit must be able to perform 180 fire missions during a 24 hour period.

There is nothing sacred about the mission day horizon being 24 hours. The user could specify a shorter horizon with separate functions and frequencies during the remaining unit day. The MET builder program can treat these separately and combine the resulting MET's.

The chart in Figure 7.78 reflects the function frequencies as well as the basis for work load specifications (hours or minutes). Either mode may be specified for any single function or task at any time.

Finally in Figure 7.78 there is a number (1 for platoon leader through FDC RTO; 6 for all others) that specifies how many simultaneous performances of the function or task are required for each skill. The number 6 is oriented to the six mortars in a platoon.

We can run the METBLD program from the AMORE program on disk 2 or type in "RUN METBLD."

```
]RUN METBLD
                    A M O R E

                 M E T   B U I L D E R



ENTER DATA FILE NAME - MORTP

READING IN MORTAR PLATOON - PERSONNEL
 MISSION ESSENTIAL TEAM

TOTAL MET REQUIREMENT
 BEING COUNTED BY TEAM
DIMENSIONING FOR NUMBER OF
 TASKS OR FUNCTIONS

HOW MANY TASKS OR FUNCTIONS?
 (MAXIMUM FOR DIMENSIONING) - 6
```

Figure 7.79

In this case we read-in the MORTP (Mortar Platoon Personnel) data file developed in the Preprocessor with zero MET requirements.

We specify 6 as an upper limit to the functions or tasks dimensioning and this leads to the first menu.

```
T E R M I N A L   O P T I O N S

 METBLD - MORTAR PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     MET BUILD OPTIONS
 2     FILE AND PROGRAM OPTIONS

 3     PRINT OPTIONS

 4     STOP

ENTER YOUR CHOICE - ?1
```

Figure 7.80

We choose 1 to get to the MET build options.

```
M E T   B U I L D   R O U T I N E S

 METBLD - MORTAR PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     ESTABLISH TASKS/FUNCTS AND FREQ
 2     CHANGE MAN HOURS AVAILABLE
 3     CHANGE TIME HORIZON
 4     DEVELOP FUNCTIONAL WORKLOADS

 5     DEV MSN ESSENTIAL RQTS
 6     ADD TRIAL MET TO CURRENT MET

 7     CHANGE CURRENT MET
 8     ZERO CURRENT MET

 9     OTHER OPTIONS

ENTER YOUR CHOICE - ?1
```

Figure 7.81

Where we choose to enter the six functions and their frequencies. Selecting 1 changes the display to:

```
IDENTIFY TASKS OR FUNCTIONS

ENTER 'T' FOR TASKS
   OR 'F' FOR FUNCTIONS - F

ACCORDING TO YOUR DIMENSIONING YOU CAN
 HAVE UP TO 6 DIFFERENT FUNCTIONS

HOW MANY FUNCTIONS? - 6

ENTER OR CHANGE TASK LABELS
```

Figure 7.82

Here we specify whether we are entering tasks or functions and how many. The opportunity will be now presented sequentially to name the functions and record their frequencies. We show this process for the first and sixth in Figures 7.83 and 7.84.

```
NAME FOR FUNCTION 1

ENTER 'EX' TO EXIT
      'RETURN' TO LEAVE VALUE UNCHANGED

FOR FUNCTION NUMBER 1

CURRENT ENTRY IS '--------------------'
   YOUR ENTRY IS  SUPERVISE

 ENTER 'EX' TO EXIT
       'RETURN TO LEAVE VALUE  UNCHANGED

FREQUENCY OF OCCURRANCE OF
 SUPERVISE IS '1'

ENTER YOUR CHOICE - 4
```

Figure 7.83

```
NAME FOR FUNCTION 6

ENTER 'EX' TO EXIT
      'RETURN' TO LEAVE VALUE UNCHANGED

FOR FUNCTION NUMBER 6

CURRENT ENTRY IS '--------------------'
   YOUR ENTRY IS  FIRE MISSIONS

 ENTER 'EX' TO EXIT
       'RETURN TO LEAVE VALUE  UNCHANGED

FREQUENCY OF OCCURRANCE OF
 FIRE MISSIONS IS '1'

ENTER YOUR CHOICE - 180
```

Figure 7.84

Note that there is a default value of 1 (function required once per mission time horizon) for the frequency of any function (also task) until over-ridden by the user. We are now returned to the MET build options.

```
M E T   B U I L D   R O U T I N E S

 METBLD - MORTAR PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     ESTABLISH TASKS/FUNCTS AND FREQ
 2     CHANGE MAN HOURS AVAILABLE
 3     CHANGE TIME HORIZON
 4     DEVELOP FUNCTIONAL WORKLOADS

 5     DEV MSN ESSENTIAL RQTS
 6     ADD TRIAL MET TO CURRENT MET

 7     CHANGE CURRENT MET
 8     ZERO CURRENT MET

 9     OTHER OPTIONS

ENTER YOUR CHOICE - ?4
```

Figure 7.85

Later we will see the man-hours available. Here in Option 2 we could set or reset them. They have a default value of 8 hours per man (available for MET functions) present for duty per 24 hours. Once functional work loads are calculated (Option 4) changing either functional frequencies (Option 1) or man hours available (Option 2) will automatically update the functional work load calculations. These calculations are the basis for Mission Essential Requirements (Option 5) which translates work load into the MET.

Option 5 must be re-exercised by the user to reflect any update. Results may be added to a prior MET calculation (or, alternatively, a prior MET calculation may be zeroed).

Option 3, changing the time horizon (defaulted at 24 hours), does not impact on my calculations but merely records the basis for other entries.

We next select option 4 and develop Functional Workloads. This step is where the program combines the input data (using the formula for skills required discussed above) for each function entered.

```
MAN HOURS REQUIRED

 METBLD - MORTAR PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     BY SELECTED FUNCTION
 2     SELECTIVELY
 3     RETURN

ENTER YOUR CHOICE - ?1
```

Figure 7.86

This intermediate menu allows the user to either enter data for each skill in sequence by function or selectively by function and, selected line item. The first method is displayed for the first skill in Figure 7.87.

```
ENTRY OF MAN HOURS
 WILL BE BY FUNCTION

ENTER FUNCTION NUMBER - 1
 FOR THE SUPERVISE FUNCTION
  4 TIMES PER 24 HOURS

FOR FUNCTION NUMBER 1
 ENTER 'H' FOR HOURS
       'M' FOR MINUTES
       ?H
```

Figure 7.87

The user is asked to select the function and then given the choice of whether the entry will be in hours or minutes. He can return at any time and still have the choice of time units. We selected hours for the first function (back in Figure 7.78 we preselected a mix of hours and minutes according to function).

We are shown a display of the supervise function and the entry of functional workload information for the platoon leader.

```
MAN HOUR REQUIREMENTS
 FOR THE SUPERVISE FUNCTION
  4 TIMES PER 24 HOURS

THERE ARE 6 TEAMS
 ENTER THE NUMBER OF SIMULTANEOUS
  APPLICATIONS OF THE
   SUPERVISE FUNCTION
    BY THE 01 PLAT LDR LINE ITEM

'RETURN' LEAVES THE VALUE AT 1
 'T' MAKES THE VALUE 6 FOR
  THE NUMBER OF TEAMS

ENTER SIMULTANEOUS APPLICATIONS
 MULTIPLIER -
 ENTER 'EX' TO EXIT
       'RETURN' TO LEAVE VALUE UNCHANGED
 CURRENT ENTRY IS 01 PLAT LDR '0'

FOR THE 01 PLAT LDR LINE ITEM
 THE NUMBER OF REQUIRED MAN HOURS
  IS - 1
```

Figure 7.88

Two entries are made for each function and each participating skill. The first entry is the Simulataneous Applications Multiplier. If the task were doing a pall bearers job, regardless of how long it takes, it requires a minimum of 6 personnel. If there are six mortar squads, they need 6 simultaneous applications of the gunner task. This entry starts with a default value of 1. In the case of the Platoon Leader he does his portion of supervise alone.

I.e., there is not an independent platoon leader doing it simultaneously. In a company with three rifle platoons, we may need to enter 3 simultaneous applications of a platoon leader function.

We continue in this way through all skills and all functions until all workloads (from Figure 7.78) are entered.

Assume that we wish to correct an entry. Let us assume that we only entered 1 simultaneous application of the Squad Leader (line item 10) for the supervise function. We begin with the man hours required menu.

```
MAN HOURS REQUIRED

 METBLD - MORTAR PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     BY SELECTED FUNCTION
 2     SELECTIVELY
 3     RETURN

ENTER YOUR CHOICE - ?2
```

Figure 7.89

We decided to do the correction selectively and enter 2.

```
OPPORTUNITY TO EDIT MET WILL BE
 BY SELECTED TEAM AND ITEM

ENTER FUNCTION NUMBER - 1
 FOR THE SUPERVISE FUNCTION
  4 TIMES PER 24 HOURS

FOR FUNCTION NUMBER 1
 ENTER 'H' FOR HOURS
       'M' FOR MINUTES
       ?H

ENTER LINE NUMBER - 10 _
```

Figure 7.90

We are asked to enter in turn the function number (1), time units (H for hours), and the line item number (10). We get the dialog shown in Figure 7.91.

```
MAN HOUR REQUIREMENTS
 FOR THE SUPERVISE FUNCTION
  4 TIMES PER 24 HOURS

THERE ARE 6 TEAMS
 ENTER THE NUMBER OF SIMULTANEOUS
  APPLICATIONS OF THE
   SUPERVISE FUNCTION
    BY THE 10 SQUAD LDR LINE ITEM

'RETURN' LEAVES THE VALUE AT 1
 'T' MAKES THE VALUE 6 FOR
  THE NUMBER OF TEAMS

ENTER SIMULTANEOUS APPLICATIONS
 MULTIPLIER - T

 ENTER 'EX' TO EXIT
       'RETURN' TO LEAVE VALUE UNCHANGED
 CURRENT ENTRY IS 10 SQUAD LDR '.17'

FOR THE 10 SQUAD LDR LINE ITEM
 THE NUMBER OF REQUIRED MAN HOURS
  IS - 1
```

Figure 7.91

The value 1 in the third paragraph of Figure 7.91 shows the current number of simultaneous applications as 1. We wish to override this to be 6. We can do it, in this case, by entering either "6" or "T." WE enter "T." The next paragraph reflects the current workload as .17. The program is converting our original entry of 1 hour and 1 application to one-sixth of an hour and six applicatoins. We must override that and enter 1 for <u>each</u> of the now 6 simultaneous applications.

Thus the program will automatically reflect at any time what workloads are in place according to the current number of simultaneous applications.

Next we return to the MET Build Routines menu.

```
M E T   B U I L D   R O U T I N E S

 METBLD - MORTAR PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     ESTABLISH TASKS/FUNCTS AND FREQ
 2     CHANGE MAN HOURS AVAILABLE
 3     CHANGE TIME HORIZON
 4     DEVELOP FUNCTIONAL WORKLOADS

 5     DEV MSN ESSENTIAL RQTS
 6     ADD TRIAL MET TO CURRENT MET

 7     CHANGE CURRENT MET
 8     ZERO CURRENT MET

 9     OTHER OPTIONS

ENTER YOUR CHOICE - ?5
```

Figure 7.92

We could at this point change task frequencies (Option 1) or Man Hours Available (Option 2) and all workloads would automatically be updated.

We are now ready to develop Mission Essential Requirements. We show some of the initial dialog in Figure 7.93.

```
DEVELOP MISSION ESSENTIAL REQUIREMENTS

YOU CAN CHOOSE UP TO 6 FUNCTIONS
 FOR DEVELOPING MISSION ESSENTIAL
   WORKLOADS

ENTER THE NUMBER OF FUNCTIONS - 6

ENTER THE NUMBERS FOR 6 FUNCTIONS

#1 - 1

 YOU HAVE REGISTERED THE
  SUPERVISE FUNCTION
  IF YOU AGREE, ENTER 'Y' - Y

#2 - 2

 YOU HAVE REGISTERED THE
  RECONNAISSANCE FUNCTION
  IF YOU AGREE, ENTER 'Y' - Y

#3 - 3

 YOU HAVE REGISTERED THE
  MARCH ORDER FUNCTION
  IF YOU AGREE, ENTER 'Y' - Y
```

Figure 7.93

We can select any subset of the six functions we have thus far programmed. (Conceivably we could add one or more functions twice.) We chose the original six functions. But we could, for example, select only functions 5,1, and 4. After functional entry, we are prompted whether we wish to zero the trial MET.

```
IF YOU WISH TO ZERO TRIAL MET,
 ENTER 'ZERO' -
```

Figure 7.94

The purpose of this step is to permit adding to previously constructed trial METs. Since this was the first time through, the trial MET is already zeroed. Figure 7.95 appears in two steps.

```
METBLD - MORTAR PLATOON - PERSONNEL

MINIMUM ESSENTIAL PRESENT FOR DUTY

                    REQUIRED
SKILL/ITEM          FOR DUTY          SLACK

01 PLAT LDR           1.25             0
02 PLAT SGT           1.25             0
03 HQ RTO             0                0
04 PLT LD DVR         1                .25
05 PLT SG DVR         1                .25
06 FDC SC LDR         1.25             0
07 FD COMPTR          1                .06
08 FD COMPTR          1                .63
09 FDC RTO            1                .63
10 SQUAD LDR          6.13             0
11 GUNNER             6                1
12 AST GUNNER         6                1
13 AMM BEARER         6                2.63
14 HMMWV DVR          6                0

HIT 'ENTER' OR 'RETURN' TO CONTINUE -

FUNCTION 1 SUPERVISE
FUNCTION 2 RECONNAISSANCE
FUNCTION 3 MARCH ORDER
FUNCTION 4 MOVE
FUNCTION 5 EMPLACE
FUNCTION 6 FIRE MISSIONS

HIT 'ENTER' OR 'RETURN' TO CONTINUE -
```

Figure 7.95

The first table is an analysis of minimum essential present for duty requirements. This table can provide powerful analytical results. For example, if all platoon leader requirements are totaled he has enough workload for 1.25 platoon leaders. We may infer that his current 8 hour availability is too modest.

A 10 hour availability for him and the platoon Sergeant is more realistic for some scenarios. Alternatively, we may need to re-examine his functional workloads.

In some cases, we see both a requirement and a slack value. Take as an example the Platoon Leader's driver. If we calculate all his requirements they total to 6 hours when functional frequencies are taken into account. But his availability is 8 hours. Thus he is misison essential for 6/8 or .75 of his total availability. If there is 1 simultaneous application there is a slack of 1 minus .75 or .25 as shown.

In general "Required for Duty" is calculated as total workload or largest simultaneous application requirement (considering all functions), whichever is greater. The next portion of Figure 7.95 lists the functions used to make the calculation.

Next the process develops dialog to assist the user in allocating the required workloads to teams. If a subset of six functions had been used, only the subset workloads would be listed.

```
TRIAL MET NOW BEING DEVELOPED

THERE ARE 6 TEAMS

THERE ARE AT MOST 1 SIMULTANEOUS
 REQUIREMENTS FOR 01 PLAT LDR

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     ALLOCATE EVENLY TO TEAMS
       (ROUND UP)
 2     ALLOCATE EVENLY TO TEAMS
       (ROUND OFF)
 3     ALLOCATE TO SPECIFIED TEAMS
       (ROUND UP)
 4     ALLOCATE TO SPECIFIED TEAMS
       (ROUND OFF)

ENTER YOUR CHOICE - ?4
```

Figure 7.96

Assume that we have decided, based on post slack analysis, to round off requirements, rather than round up.

Our first presentation is the allocation of the platoon leader to teams. In this case we wish to round off his requirements (to the nearest whole skill assigned) and assign him to a specific team. We therefore choose option 4.

```
ENTER STARTING AND ENDING TEAM NUMBERS
 ENTER STARTING TEAM NUMBER - 2
 ENTER ENDING TEAM NUMBER - 2
```

Figure 7.97

This figure shows the necessary dialog to assign the platoon leader to a specific team. All requirements for one simultaneous application were allocated to specific teams. All requiring six were allocated using option 2 in Figure 7.96. Options 1 and 2 allocations are completely automatic. We now show some print options. Figure 7.98 and 7.99 show the current MET from the MORTP file. If there was a met on file we could also zero the MET.

METBLD - MORTAR PLATOON - PERSONNEL
CUMULATIVE MISSION ESSENTIAL TEAMS

	TM1	TM2	TM3	TM4	TM5
01 PLAT LDR	0	0	0	0	0
02 PLAT SGT	0	0	0	0	0
03 HQ RTO	0	0	0	0	0
04 PLT LD DVR	0	0	0	0	0
05 PLT SG DVR	0	0	0	0	0
06 FDC SC LDR	0	0	0	0	0
07 FD COMPTR	0	0	0	0	0
08 FD COMPTR	0	0	0	0	0
09 FDC RTO	0	0	0	0	0
10 SQUAD LDR	0	0	0	0	0
11 GUNNER	0	0	0	0	0
12 AST GUNNER	0	0	0	0	0
13 AMM BEARER	0	0	0	0	0
14 HMMWV DVR	0	0	0	0	0
TOTAL	0	0	0	0	0

Figure 7.98

METBLD - MORTAR PLATOON - PERSONNEL
CUMULATIVE MISSION ESSENTIAL TEAMS

	TM6
01 PLAT LDR	0
02 PLAT SGT	0
03 HQ RTO	0
04 PLT LD DVR	0
05 PLT SG DVR	0
06 FDC SC LDR	0
07 FD COMPTR	0
08 FD COMPTR	0
09 FDC RTO	0
10 SQUAD LDR	0
11 GUNNER	0
12 AST GUNNER	0
13 AMM BEARER	0
14 HMMWV DVR	0
TOTAL	0

Figure 7.99

Figures 7.100 and 7.101 show the trial MET we just built. Note the Platoon Leader starting in team 2 and the Platoon Sergeant starting in team 4.

METBLD - MORTAR PLATOON - PERSONNEL
CUMULATIVE TRIAL MET REQUIREMENTS

	TM1	TM2	TM3	TM4	TM5
01 PLAT LDR	0	1	1	1	1
02 PLAT SGT	0	0	0	1	1
03 HQ RTO	0	0	0	0	0
04 PLT LD DVR	0	1	1	1	1
05 PLT SG DVR	0	0	0	1	1
06 FDC SC LDR	1	1	1	1	1
07 FD COMPTR	1	1	1	1	1
08 FD COMPTR	0	0	0	1	1
09 FDC RTO	1	1	1	1	1
10 SQUAD LDR	1	2	3	4	5
11 GUNNER	1	2	3	4	5
12 AST GUNNER	1	2	3	4	5
13 AMM BEARER	1	2	3	4	5
14 HMMWV DVR	1	2	3	4	5
TOTAL	8	15	20	28	33

Figure 7.100

METBLD - MORTAR PLATOON - PERSONNEL
CUMULATIVE TRIAL MET REQUIREMENTS

	TM6
01 PLAT LDR	1
02 PLAT SGT	1
03 HQ RTO	0
04 PLT LD DVR	1
05 PLT SG DVR	1
06 FDC SC LDR	1
07 FD COMPTR	1
08 FD COMPTR	1
09 FDC RTO	1
10 SQUAD LDR	6
11 GUNNER	6
12 AST GUNNER	6
13 AMM BEARER	6
14 HMMWV DVR	6
TOTAL	38

Figure 7.101

We use the MET Build Options to transfer (add) the trial MET to the current and that transforms the zeros of Figures 7.98 and 7.99 to Figures 7.102 and 7.103.

METBLD - MORTAR PLATOON - PERSONNEL
CUMULATIVE MISSION ESSENTIAL TEAMS

	TM1	TM2	TM3	TM4	TM5
01 PLAT LDR	0	1	1	1	1
02 PLAT SGT	0	0	0	1	1
03 HQ RTO	0	0	0	0	0
04 PLT LD DVR	0	1	1	1	1
05 PLT SG DVR	0	0	0	1	1
06 FDC SC LDR	1	1	1	1	1
07 FD COMPTR	1	1	1	1	1
08 FD COMPTR	0	0	0	1	1
09 FDC RTO	1	1	1	1	1
10 SQUAD LDR	1	2	3	4	5
11 GUNNER	1	2	3	4	5
12 AST GUNNER	1	2	3	4	5
13 AMM BEARER	1	2	3	4	5
14 HMMWV DVR	1	2	3	4	5
TOTAL	8	15	20	28	33

Figure 7.102

METBLD - MORTAR PLATOON - PERSONNEL
CUMULATIVE MISSION ESSENTIAL TEAMS

	TM6
01 PLAT LDR	1
02 PLAT SGT	1
03 HQ RTO	0
04 PLT LD DVR	1
05 PLT SG DVR	1
06 FDC SC LDR	1
07 FD COMPTR	1
08 FD COMPTR	1
09 FDC RTO	1
10 SQUAD LDR	6
11 GUNNER	6
12 AST GUNNER	6
13 AMM BEARER	6
14 HMMWV DVR	6
TOTAL	38

Figure 7.103

Other print options include the Functions and Frequencies

METBLD - MORTAR PLATOON - PERSONNEL

FUNCTION	FREQUENCY
SUPERVISE	4
RECONNAISSANCE	4
MARCH ORDER	4
MOVE	4
EMPLACE	4
FIRE MISSIONS	180

Figure 7.104

Next we see Man Hours Available

METBLD - MORTAR PLATOON - PERSONNEL

TIME HORIZON IS NOW 24

SKILL	MAN HOURS AVAILABLE
01 PLAT LDR	8
02 PLAT SGT	8
03 HQ RTO	8
04 PLT LD DVR	8
05 PLT SG DVR	8
06 FDC SC LDR	8
07 FD COMPTR	8
08 FD COMPTR	8
09 FDC RTO	8
10 SQUAD LDR	8
11 GUNNER	8
12 AST GUNNER	8
13 AMM BEARER	8
14 HMMWV DVR	8

Figure 7.105

If either the frequencies of Figure 7.104 or the man hours available of Figure 7-105 are now changed, the workloads totaled in Figure

7.95 above will automatically change but the trial MET must either be redeveloped or added onto. Figure 7.106 shows simultaneous applications and total numbers of productive individuals named by selected function (in this case the Move function). This chart automatically changes when function frequencies or man hours required are changed.

METBLD - MORTAR PLATOON - PERSONNEL

TIME HORIZON IS NOW 24

MINIMUM NUMBERS REQUIRED
FOR THE MOVE FUNCTION
4 TIMES IN 24 HOURS

SKILL/ITEM	SIMULTANEOUS APPLICATIONS	NUMBERS REQUIRED
01 PLAT LDR	1	.5
02 PLAT SGT	1	1
03 HQ RTO	1	0
04 PLT LD DVR	1	.5
05 PLT SG DVR	1	.5
06 FDC SC LDR	1	1
07 FD COMPTR	1	0
08 FD COMPTR	1	0
09 FDC RTO	1	0
10 SQUAD LDR	1	0
11 GUNNER	1	0
12 AST GUNNER	1	0
13 AMM BEARER	1	0
14 HMMWV DVR	6	6

Figure 7.106

Figures 7.107 and 7.108 show a breakout of productive skills required.

METBLD - MORTAR PLATOON - PERSONNEL
DISTRIBUTION OF PRODUCTIVITY RQD
BY EACH FUNCTION - EACH SKILL/ITEM

	FU1	FU2	FU3	FU4	FU5
01 PLAT LDR	.4	.2	-	.4	-
02 PLAT SGT	-	.2	-	.8	-
04 PLT LD DVR	-	.33	-	.67	-
05 PLT SG DVR	-	.33	-	.67	-
06 FDC SC LDR	-	.2	-	.8	-
07 FD COMPTR	.53	.27	-	-	-
08 FD COMPTR	-	-	-	-	-
09 FDC RTO	-	-	-	-	-
10 SQUAD LDR	.49	.24	.04	-	.04
11 GUNNER	-	-	.05	-	.05
12 AST GUNNER	-	-	.05	-	.05
13 AMM BEARER	-	-	.22	-	.44
14 HMMWV DVR	-	-	-	1	-

FUNCTION 1 SUPERVISE
FUNCTION 2 RECONNAISSANCE
FUNCTION 3 MARCH ORDER
FUNCTION 4 MOVE
FUNCTION 5 EMPLACE

Figure 7.107

METBLD - MORTAR PLATOON - PERSONNEL
DISTRIBUTION OF PRODUCTIVITY RQD
BY EACH FUNCTION - EACH SKILL/ITEM

	FU6
01 PLAT LDR	-
02 PLAT SGT	-
04 PLT LD DVR	-
05 PLT SG DVR	-
06 FDC SC LDR	-
07 FD COMPTR	.2
08 FD COMPTR	1
09 FDC RTO	1
10 SQUAD LDR	.18
11 GUNNER	.9
12 AST GUNNER	.9
13 AMM BEARER	.33
14 HMMWV DVR	-

FUNCTION 6 FIRE MISSIONS

Figure 7.108

The above figures display five functions at a time (limited by the screen display) and list the names of the functions after. The numbers are proportions of available productive time spent on the columnar function. Across the functions the proportions sum to 1.

Having created a trial MET and transferred it to the current MET array, we now need to file it.

```
T E R M I N A L   O P T I O N S

 METBLD - MORTAR PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     MET BUILD OPTIONS
 2     FILE AND PROGRAM OPTIONS

 3     PRINT OPTIONS

 4     STOP

ENTER YOUR CHOICE - ?2
```

Figure 7.109

We select the File and Program Options.

```
T E R M I N A L   O P T I O N S

 METBLD - MORTAR PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     CATALOG,D1
 2     CATALOG,D2

 3     UNLOCK, SAVE, LOCK METBLD,D1
 4     UNLOCK, SAVE, LOCK METBLD,D2

 5     CREATE DATA FILE

 6     OTHER OPTIONS

ENTER YOUR CHOICE - ?5
```

Figure 7.110

and then Option 5

```
 METBLD - MORTAR PLATOON - PERSONNEL

 ENTER DATA FILE NAME - MORTPMET

 IF YOU WISH TO DELETE A FILE
  WITH THE SAME NAME, ENTER 'D' -


 IF YOU ALSO WISH TO CREATE THE FILE,
  ENTER 'C' - C

 CREATING MORTPMET,D1

 IF YOU WISH TO BACKUP,
  ENTER 'B' -
```

Figure 7.111

This file will contain all the labels and dimensioning of the original Unit data file plus the MET (just built).

It will not contain initial strength, substitutability, probabilities, or commanders reaction times. The reason for this was to save memory space by not having to store the above deleted arrays. But there is now a requirement to inject this file into a unit data file. For this we use a program called MET MERGER which may be called from the AMORE program on disk 2 or . . .

```
]RUN METMRG
                    A M O R E

              M E T   M E R G E R


ENTER DATA FILE NAME - MORTP

READING IN MORTAR PLATOON - PERSONNEL


ENTER MET FILE NAME - MORTPMET

READING IN MORTAR PLATOON - PERSONNEL
 MISSION ESSENTIAL TEAM


 METMRG - MORTAR PLATOON - PERSONNEL
```

Figure 7.112

We read in the associated unit Data file first and then the MET file just created. From the main menu:

```
SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     CATALOG,D1
 2     CATALOG,D2

 3     UNLOCK, SAVE, LOCK METMRG,D1
 4     UNLOCK, SAVE, LOCK METMRG,D2

 5     CREATE DATA FILE
 6     READ MET FILE

 7     STOP

ENTER YOUR CHOICE - ?5
```

Figure 7.113

We select the Create a Data File Option. As we read in the newly created MET file (MORTPMET) it automatically merges with the unit data stored in the computer. If the unit data file already had MET data this program writes over any old, MET data with the new MET file.

Figure 7.114 shows the dialog to create a new data file (now with MORTPMET information).

```
METMRG - MORTAR PLATOON - PERSONNEL

ENTER DATA FILE NAME - MORTP

IF YOU WISH TO DELETE A FILE
 WITH THE SAME NAME, ENTER 'D' - D

IF THE FILE IS NOW LOCKED,
 ENTER 'L' - L

IF YOU ALSO WISH TO CREATE THE FILE,
 ENTER 'C' - C

UNLOCKING MORTP,D1
DELETING MORTP,D1
CREATING MORTP,D1

IF YOU WISH TO BACKUP,
 ENTER 'B' -
```

Figure 7.114

This program was built to be flexible. We must read in a unit data file as the first file once the program is RUN. But the second file can either be a MET file or a unit data file. In the latter case we would merge the MET only from the second file with the remaining unit data from the first file.

We may also, at this point, read in an alternate MET file (or unit data file) and create an alternate merged unit data file.

To do this we would go from the menu

```
METMRG - MORTAR PLATOON - PERSONNEL

  SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     CATALOG,D1
 2     CATALOG,D2

 3     UNLOCK, SAVE, LOCK METMRG,D1
 4     UNLOCK, SAVE, LOCK METMRG,D2

 5     CREATE DATA FILE
 6     READ MET FILE

 7     STOP

ENTER YOUR CHOICE - ?6
```

Figure 7.115

to Option 6

```
ENTER MET FILE NAME - SCOUTP

READING IN SCOUT PLATOON - PERSONNEL
 MISSION ESSENTIAL TEAM
INCOMPATIBLE

14 VS 11 LINE ITEMS

6 VS 6 TEAMS

MORTAR PLATOON - PERSONNEL VS
 SCOUT PLATOON - PERSONNEL
```

Figure 7.116

Notice in this case the unit data was from the original Mortar Platoon. If we try to read a MET file from another unit, the read in will be bypassed with messages as shown above. This protects inadvertent erronious MET merging.

7.6 PERSONNEL DEGRADER

The AMORE curves developed in the Time Capability Simulator and saved as a Capability-as-a-Function-of-Time (CFT) file assume that all skills assinged to a MET are fully productive and trained to perform the given tasks or functions.

There may be environmental or other reasons for viewing that outcome as a best case; an upper bound of unit capability. In a chemical warfare environment, for example, assuming the Mission Oriented Protective Postures (MOPP) can lower the rate of productivity of an individual. What impact does that have on the team?

The Personnel Degrader utility program assists the user in estimating a band of capability performance of the unit, based on individual productivities of skills assigned to METs.

Assume a team in which one-third of the personnel are performing at full productivity, one third at 75% productivity and one third at 50% productivity. The worst possible case is that every one on the team is either performing their tasks at a 50% productivity rate or waiting on those who are. The team lower band in that case is 50% (or the value of the least productive team member).

One way to measure productivity is to compare an individual's degraded duty cycle (i.e., work minutes to work minutes plus replenishment or rest minutes) with his fully productive duty cycle. The ratio of degraded duty cycle to full duty cycle is his relative productivity. In the above example, if the team is perfectly trained, those individuals who would be waiting on others (e.g., 100% productives) could use some of their waiting time (slack) to perform more demanding tasks. One example is that the 100% productive third devotes some of its time to the 50% productivity tasks. It can be shown in this case, that the team could reach an upper bound of 75% productivity. Let us generalize the process for three levels of individual productivity. Call the respective productivity proportions P_1, P_2, and P_3. The P_i are the rate at which the job can be performed realtive to full team performance standards. Assume that H sills are required for the high level P_1 tasks, M skills are required for medium level P_2 tasks, and L skills are required for the low level P_3 tasks. Productive skill units are respectively the multiplications:

P_1H
P_2M
P_3L

In the No Team Training case, team performance is limited by the slowest member.

In the full team training case, we re-allocate waiting time. Let t_{13}, for example, be time (man hours) re-allocated from level 1 to level 3.

If teams are fully trained, it is assumed that we have done this re-allocation efficiently so that all effective productivities are in balance. Then the least productive member is working at a rate of the most productive member. Call that balanced productivity P. Then under an ideal re-allocation

$$P_1 (H - t_{12} - t_{13}) = HP \quad (1)$$

where $(H - t_{12} - t_{13})$ is productive man days allocated to the High level productivity skills. Hp is the net effect of all of the H skill hours allocated with a balanced productivity P.

Likewise

$$P_2 (M - t_{23} + t_{12}) = MP \quad (2)$$

and

$$P_3 (L + t_{13} + t_{23}) = LP \quad (3)$$

If we add each side of equations 1,2, and 3, the t_{ji} within the parenthesis of the left members cancel out and we are left with

$$P_1H + P_2M + P_3L = HP + MP + LP$$

or

$$\frac{P_1H + P2M + P3L}{H + M + L} = P$$

Thus the upper bound P can be calculated as an average of the populations at the 3 levels weighted by their relative productivity of team task performance.

The above argument can be easily extended to as many levels of degradation as there are separate skills or tasks in any individual MET.

We can run the Personnel Degrader from the AMORE program on disk 2 or by

```
RUN PERDEG
                    A M O R E
P E R S O N N E L   D E G R A D E R


ENTER DATA FILE NAME - SCOUTP
READING IN SCOUT PLATOON - PERSONNEL
MET TOTALS BEING COUNTED
```

Figure 7.117

```
SCREENPRINTS AND CALCULATIONS
 SCOUT PLATOON - PERSONNEL
   SELECT FROM THE FOLLOWING OPTIONS
ENTER TO GET
 1     SEE INPUT PRODUCTIVITIES
 2     SEE EFFECTIVE TEAMS
 3     ENTER INPUT PRODUCTIVITIES
 4     LINEPRINT
 5     PROGRAM AND FILE OPTIONS
 6     CAPABILITY DISPLAYS
 7     STOP
ENTER YOUR CHOICE - ?1
```

Figure 7.118

We select in turn options 1 and 2 to get Figures 7.119 and 7.120

SCOUT PLATOON - PERSONNEL

INPUT PRODUCTIVITIES

SKILL	PRODUCTIVITY
01 PLT LDR	1
02 PLT SGT	1
03 GUNNER	1
04 SCOUT	1
05 SCOUT DVR	1
06 SECT LDR	1
07 SQD LDR	1
08 GUNNER	1
09 SCOUT	1
10 SCOUT DVR	1
11 SCOUT	1

HIT RETURN TO CONTINUE - ___

Figure 7.119

SCOUT PLATOON - PERSONNEL

EFFECTIVE TEAMS

TEAM	NO TEAM TRAINING	FULL TEAM TRAINING
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6

Figure 7.120

The program initializes with all productivities set at 1 (full). When that is the case the team productivity will be full and in Figure 7.120 this is reflected as the full available cumulative capability. I.e.,

if you can build 5 teams worth of capability, you can get 5 full teams worth of output. Thus in Figure 7.120 the "Team" column is the input capability available. The "No" and "Full" training columns represent output capability when degradation is taken into consideration. So far no degradation is present; all productivities are at 1.

Next, we need to look at capability as a function of time.

```
SCREENPRINTS AND CALCULATIONS

 SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SEE INPUT PRODUCTIVITIES
 2     SEE EFFECTIVE TEAMS

 3     ENTER INPUT PRODUCTIVITIES

 4     LINEPRINT
 5     PROGRAM AND FILE OPTIONS

 6     CAPABILITY DISPLAYS

 7     STOP

ENTER YOUR CHOICE - ?5
```

Figure 7.121

We select Option 5 to get Figure 7.122

```
PROGRAMMING OPTIONS

 SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     CATALOG,D1
 2     CATALOG,D2

 3     UNLOCK, SAVE, LOCK PERDEG,D1
 4     UNLOCK, SAVE, LOCK PERDEG,D2

 5     READ CAPABILITY-VS-TIME FILE
 6     READ MET FILE

 7     RETURN

ENTER YOUR CHOICE - ?5
```

Figure 7.122

Here we have 2 options which are significant to degraded team performance. We could read in a new MET file, like the one built in the list section (MET builder) or a new (but compatible) unit data file with option 6.

Or we can read in a CFT file with option 5

```
ENTER CAPABILITY-VS-TIME
 FILE NAME - CFTSCOP6

READING CFTSCOP6
```

Figure 7.123

We return to the main menu.

```
SCREENPRINTS AND CALCULATIONS

 SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SEE INPUT PRODUCTIVITIES
 2     SEE EFFECTIVE TEAMS

 3     ENTER INPUT PRODUCTIVITIES

 4     LINEPRINT
 5     PROGRAM AND FILE OPTIONS

 6     CAPABILITY DISPLAYS

 7     STOP

ENTER YOUR CHOICE - ?6
```

Figure 7.124

We select the capability displays (Option 6) for the CFT file just entered.

```
CAPABILITY SCREENPRINTS

 SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     ZERO TIME CAPABILITY
 2     MINIMUM RECONSTITUTION CAPABILITY
 3     MAXIMUM CAPABILITY

 4     TEAM CAPABILITY VERSUS TIME
 5     PERCENT CAPABILITY VERSUS TIME

 6     LINEPRINT
 7     OTHER OPTIONS

ENTER YOUR CHOICE - ?3
```

Figure 7.125

We will select in turn options 3 and 4 as examples of the types of displays available.

```
UNDEGRADED TEAMS
 AT MAXIMUM RECONSTITUTION
  BY REPLICATION

R 1/T 6    R 2/T 6    R 3/T 5    R 4/T 5
R 5/T 4    R 6/T 4

HIT RETURN TO CONTINUE -
MAXIMUM RECONSTITUTION
 TEAM FREQUENCY COUNT

            DEGRADED   DEGRADED
FULL        NO TEAM    FULL TEAM  NUMBER
TEAMS       TRAINING   TRAINING   BUILT

4             4          4          2
5             5          5          2
6             6          6          2

HIT RETURN TO CONTINUE -
```

Figure 7.126

The first portion of Figure 7.126 shows Maximum Reconstitution Capability by replication. This part of the display will show teams that were built with some frequency and a "No" and "Full" team interpretation of their output productivity (now full). Finally the frequency at which this occurred in the sampling is reflected.

The next CFT display is in two parts as limited by screen size.

SCOUT PLATOON - PERSONNEL

CAPABILITY AS A FUNCTION OF TIME
AVERAGE TEAMS IN 6 REPLICATIONS

TIME	NO TEAM TRAINING	FULL TEAM TRAINING
0	2.8	2.8
.1	3.3	3.3
.2	4.2	4.2
.3	4.8	4.8
.4	4.8	4.8
.5	4.8	4.8
.6	4.8	4.8
.7	5.0	5.0
.8	5.0	5.0
.9	5.0	5.0
1.0	5.0	5.0
1.2	5.0	5.0
1.4	5.0	5.0
1.6	5.0	5.0
1.8	5.0	5.0

HIT RETURN TO CONTINUE -

Figure 7.127

SCOUT PLATOON - PERSONNEL

CAPABILITY AS A FUNCTION OF TIME
AVERAGE TEAMS IN 6 REPLICATIONS

TIME	NO TEAM TRAINING	FULL TEAM TRAINING
2.0	5.0	5.0
2.5	5.0	5.0
3.0	5.0	5.0
3.5	5.0	5.0
4.0	5.0	5.0
5.0	5.0	5.0
6.0	5.0	5.0
8.0	5.0	5.0

HIT RETURN TO CONTINUE -

Figure 7.128

The CFT file contains capability as a function of time data points, (pre-selected in the time capability simulator) for each replication. Normally, the Time Capability Simulator and Coordinated Capability Module simply average these capabilities across the replications by time data point. This Personnel Degrader program first transforms input capability into output capability using a lookup table such as in Figure 7.120 above. Then each resulting capability is averaged. Thus far since all input productivities are 1, output capability equals input capability. Accordingly the capability in Figures 7.127 and 7.128 will be the same as would be seen in the Time Capability Simulator or in the Capability Coordinator Module.

Next we input degraded productivities.

```
SCREENPRINTS AND CALCULATIONS

 SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SEE INPUT PRODUCTIVITIES
 2     SEE EFFECTIVE TEAMS

 3     ENTER INPUT PRODUCTIVITIES

 4     LINEPRINT
 5     PROGRAM AND FILE OPTIONS

 6     CAPABILITY DISPLAYS

 7     STOP

ENTER YOUR CHOICE - ?3
```

Figure 7.129

We select Option 3 to get

```
ENTER ---> PRODUCTIVITY BY SKILL

 SCOUT PLATOON - PERSONNEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     SEQUENTIAL PRESENTATION
 2     SELECTIVE PRESENTATION
 3     CONTINUE

ENTER YOUR CHOICE - ?1
```

Figure 7.130

We decide to enter all productivities by selecting option 1 and Figure 7.131 shows the first two entries

```
SEQUENTIAL ENTRY OF PRODUCTIVITY
 BY SKILL


 ENTER 'EX' TO EXIT
       'RETURN' TO LEAVE VALUE UNCHANGED
 CURRENT SKILL PRODUCTIVITY IS
01 PLT LDR '1'    YOUR ENTRY - .8

 ENTER 'EX' TO EXIT
       'RETURN' TO LEAVE VALUE UNCHANGED
 CURRENT SKILL PRODUCTIVITY IS
02 PLT SGT '1'    YOUR ENTRY - .7
```

Figure 7.131

We can now look at an updated set of input productivities and a revised set of effective teams.

SCOUT PLATOON - PERSONNEL

INPUT PRODUCTIVITIES

SKILL	PRODUCTIVITY
01 PLT LDR	.8
02 PLT SGT	.7
03 GUNNER	.5
04 SCOUT	.4
05 SCOUT DVR	.6
06 SECT LDR	.7
07 SQD LDR	.5
08 GUNNER	.5
09 SCOUT	.4
10 SCOUT DVR	.6
11 SCOUT	.4

Figure 7.132

SCOUT PLATOON - PERSONNEL

EFFECTIVE TEAMS

TEAM	NO TEAM TRAINING	FULL TEAM TRAINING
1	.4	.5
2	.8	1
3	1.2	1.5
4	1.6	2.1
5	2	2.6
6	2.4	3.1

Figure 7.133

In Figure 7.133 the output effective teams are now different than the input capability present. We are now seeing a band of team performance with a lower bound reflected by the "No" team training column and an upper bound reflected by "Full" team training.

Next, we look at the maximum reconstruction case as we did before.

UNDEGRADED TEAMS
AT MAXIMUM RECONSTITUTION
BY REPLICATION

R 1/T 6 R 2/T 6 R 3/T 5 R 4/T 5
R 5/T 4 R 6/T 4

MAXIMUM RECONSTITUTION
TEAM FREQUENCY COUNT

FULL TEAMS	DEGRADED NO TEAM TRAINING	DEGRADED FULL TEAM TRAINING	NUMBER BUILT
4	1.6	2.1	2
5	2	2.6	2
6	2.4	3.1	2

Figure 7.134

The first part of the display is unchanged and shows input capability by replication. The second portion interprets this in terms of "No" and "Full" team training and their respective frequencies of occurrance.

Next we examine capability as a function of time.

SCOUT PLATOON - PERSONNEL

CAPABILITY AS A FUNCTION OF TIME
AVERAGE TEAMS IN 6 REPLICATIONS

TIME	NO TEAM TRAINING	FULL TEAM TRAINING
0	1.1	1.5
.1	1.3	1.7
.2	1.7	2.2
.3	1.9	2.5
.4	1.9	2.5
.5	1.9	2.5
.6	1.9	2.5
.7	2.0	2.6
.8	2.0	2.6
.9	2.0	2.6
1.0	2.0	2.6
1.2	2.0	2.6
1.4	2.0	2.6
1.6	2.0	2.6
1.8	2.0	2.6
2.0	2.0	2.6
2.5	2.0	2.6
3.0	2.0	2.6
3.5	2.0	2.6
4.0	2.0	2.6
5.0	2.0	2.6
6.0	2.0	2.6
8.0	2.0	2.6

Figure 7.135

This display now shows the results of the CFT file interpreted as a band of degraded team performance ranging from "No" to "Full" team training.

7.7 SURVIVOR LINKAGE

In a standard development and use of a unit data file we input personnel and materiel degradation probabilities in the Preprocessor and sample them in the Organizational Capability Simulator.

Implicit in that process is the assumption that personnel and materiel degradation probabilities are independent. We justify that approach by stating that we examine capabilities of organizations in a broad banded sense; e.g., that we do not assume that tank drivers are always in their tanks.

Personnel may be on the perimeter, asleep, eating, going through troop leading procedures, maintaining, rehearsing for the next action, etc. If these are heroic assumptions, the other extreme assumptions are also herioc, i.e., that we know exactly where each and every personnel and materiel element are. It is unlikely any unit will totally meet the later requirement at any one time.

Apart from that, the user needs the capability to be able to say where an independent probability versus dependent probability examination of capability differs and whether that difference is operationally significant. At least he may now perform sensitivity analysis using a dependent probability structure.

We may initiate the program from the AMORE program on disk 1 or . . .

```
]RUN SURLIN
                A M O R E

          S U R V I V O R

                L I N K

          G E N E R A T O R


ENTER PERSONNEL DATA FILE NAME
 SCOUTP

READING IN SCOUT PLATOON - PERSONNEL
 DATA

ENTER MATERIEL DATA FILE NAME
 SCOUTM

READING IN SCOUT PLATOON - MATERIEL
 DATA

HOW MANY REPLICATIONS -
 (MAXIMUM FOR DIMENSIONING PURPOSES)?
 6
```

Figure 7.136

This program begins by reading in a unit data file. We will then establish cause and effect links among personnel and materiel line items. New dependent probabilities will be entered based on those linkages. We will then sample based on both independent and dependent probabilities and create linked survivor files which may then be run through the Organizational Capability Simulator.

```
ALGORITHMS AND SCREENPRINTS

 SURLIN - SCOUT PLATOON - PERSONNEL
 SURLIN - SCOUT PLATOON - MATERIEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

  1     PROGRAM AND FILE OPTIONS

  2     ADD OR DELETE LINKS
  3     DEVELOP LINK PROBABILITIES
  4     SAMPLE FOR SURVIVORS

  5     SEE PRIMARY LINKS
  6     SEE SECONDARY LINKS
  7     SEE PROBABILITIES
  8     SEE PERSONNEL SURVIVORS
  9     SEE MATERIEL SURVIVORS

 10     LINEPRINT

ENTER YOUR CHOICE - ?7
```

Figure 7.137

We first show the independent probabilities which were established in the Preprocessor. Note that the unit titles reflect both personnel and materiel.

```
SCREENPRINT PROBABILITIES

 SURLIN - SCOUT PLATOON - PERSONNEL
 SURLIN - SCOUT PLATOON - MATERIEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     INDEPENDENT PROBABILITIES
 2     DEPENDENT PROBABILITIES

 3     LINEPRINT

 4     OTHER OPTIONS

ENTER YOUR CHOICE - ?1
```

Figure 7.138

The probability print menu allows us to examine either independent or dependent probabilities. At this point, we have no dependent probabilities but can re-examine those probabilities developed back in the Preprocessor.

```
INDEPENDENT PROBABILITIES - PERSONNEL

ITEM                    PROBABILITY

01 PLT LDR                   .15
02 PLT SGT                   .15
03 GUNNER                    .15
04 SCOUT                     .15
05 SCOUT DVR                 .15
06 SECT LDR                  .15
07 SQD LDR                   .15
08 GUNNER                    .15
09 SCOUT                     .15
10 SCOUT DVR                 .15
11 SCOUT                     .15

HIT 'RETURN' TO CONTINUE -
```

Figure 7.139

INDEPENDENT PROBABILITIES - MATERIEL

ITEM	LIGHT	MODERATE	SEVERE
01 CHEM ALARM	.2	.1	.05
02 CFV M3	.2	.1	.05
03 IM-74	.2	.1	.05
04 AN/VRC-46	.2	.1	.05
05 AN/VRC-160	.2	.1	.05
06 CHEM ALARM	.2	.1	.05
07 CFV M3	.2	.1	.05
08 IM-174	.2	.1	.05
09 AN/VRC-46	.2	.1	.05
10 AN/GRC-160	.2	.1	.05

HIT 'RETURN' TO CONTINUE -

Figure 7.140

Materiel probabilities are displayed in cumulative format. The probability of servere damage is just that. But the probability of moderate is the probability of <u>at least</u> moderate damage to include severe. The probability of moderate-only is .1 minus .05 or .05. The probability of light is the probability of at least light damage to include moderate and severe. The probability of light-only damage is .2 minus .1 or .1.

We return to the main menu to set up the dependency linkages.

```
 SURLIN - SCOUT PLATOON - PERSONNEL
 SURLIN - SCOUT PLATOON - MATERIEL

    SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

  1     PROGRAM AND FILE OPTIONS

  2     ADD OR DELETE LINKS
  3     DEVELOP LINK PROBABILITIES
  4     SAMPLE FOR SURVIVORS

  5     SEE PRIMARY LINKS
  6     SEE SECONDARY LINKS
  7     SEE PROBABILITIES
  8     SEE PERSONNEL SURVIVORS
  9     SEE MATERIEL SURVIVORS

 10     LINEPRINT

ENTER YOUR CHOICE - ?2
```

Figure 7.141

We select option 2 to set up linkages.

```
 ADD OR DELETE ---> LINKS

 SURLIN - SCOUT PLATOON - PERSONNEL
 SURLIN - SCOUT PLATOON - MATERIEL

    SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

  1     SEQUENTIAL ADDONS
  2     SELECTIVE ADDONS
  3     DELETE A LINK (SELECTIVELY)

  4     RETURN

ENTER YOUR CHOICE - ?2
```

Figure 7.142

This menu provides choices similar to prior entries or edits.

The first step is to enter whether the primary of the link in question is a personnel or materiel item. We wish to enter the Combat Fighting Vehicle (item 7 - materiel).

```
SELECTIVE ENTRY OF NEW LINKS

DESIGNATE PERSONNEL OR MATERIEL
 FOR THE PRIMARY

IF PERSONNEL ENTER 'P'
 IF MATERIEL ENTER 'M' - M


ENTER LINE ITEM NUMBER - 7
```

Figure 7.143

Having made that entry, we entered the line item

```
07 CFV M3 IS CURRENTLY INDEPENDENT

 ENTER 'EX'      TO EXIT
       'RETURN'  FOR NO CHANGE
       'L'       TO ADD A LINK

 ENTER YOUR CHOICE - L


IF THE ITEM TO BE LINKED WITH
 07 CFV M3 IS

  PERSONNEL, ENTER 'P'
   MATERIEL, ENTER 'M' - P
```

Figure 7.144

We confirm that we wish to link some items with this by entering L.

Assume that we will link the loss of several personnel or materiel items to the loss of each Combat Fighting Vehicle. The first is the personnel section leader item 6. We first enter that the item to be linked is personnel in Figure 7.144 then

```
ENTER SECONDARY PERSONNEL ITEM NUMBER
 6

YOU HAVE SELECTED 07 CFV M3
 AS A PRIMARY LINK TO 06 SECT LDR

IF YOU AGREE, ENTER 'YES' - YES

4 OF 07 CFV M3 ASSOCIATE WITH
 2 OF 06 SECT LDR FOR A RATIO OF .5

SINCE THE RATIO IS LESS THAN ONE,
 IF YOU WISH TO ASSOCIATE
  ONE 06 SECT LDR WITH EACH OF THE
   FIRST 2 07 CFV M3 ENTER 'YES' - YES

IF YOU WISH TO LINK MORE WITH
 07 CFV M3, ENTER 'L' - L
```

Figure 7.145

We enter the Secondary personnel link item number. The titles of primary and secondary are displayed. We confirm agreement by entering yes.

Figure 7.145 now shows that ther are 4 CFV's and only 2 section leaders or .5 section leaders per vehicle.

In a case such as this the only way we can link them is to have 1 section leader in the first CFV sampled and 1 section leader in the second. The next yes confirmation agrees to that form of linkage, if the user wishes to link to other packaging, he needs to Preprocess and redimension to add lines which can consider sets of CFV's and section leaders separately. In other words, a specified packaging must be set up in the original data files.

If the ratio of secondary to primary numbers is equal to 1, the user may enter 1 to get one per vehicle.

If the ratio is greater than one, he may enter any number from 1 to the number of linked items. Suppose there were 8 section leaders. The ratio will be 2. The user may enter 1 or 2. If he enters 1, then only one section leader per vehicle will be associated with the destruction of the vehicle, the remainder will be treated independently.

If he enters 2, then two section leaders per vehicles will be associated with vehicular destruction.

If the user enters 3 in the above case, the program will associate 3 per vehicle until it can no longer do so. It will then associate only 2 (the last 2) with the third vehicle. The fourth vehicle will have no section leaders associated with it.

Thus in the above case, the user may enter any integer not greater than the secondary items available. The program will associate these with the primary at the rate specified until used up, at that point zero secondary items will be associated or the lesser number remaining and then zero on the next primary sampling.

Finally in Figure 7.145, we are asked if we wish to link more secondaries with the destruction of the primary. Let us examine a later stage of this process.

```
LINKS FROM MATERIEL PRIMARY

PRIMARY IS 07 CFV M3
 SECONDARIES LINKED ARE

ITEM TYPE   ITEM                NR UNITS

PERSONNEL   06 SECT LDR           1
PERSONNEL   08 GUNNER             2
PERSONNEL   07 SQD LDR            1
PERSONNEL   09 SCOUT              1

 ENTER 'EX'      TO EXIT
       'RETURN' FOR NO CHANGE
       'L'      TO ADD A LINK

 ENTER YOUR CHOICE - L


IF THE ITEM TO BE LINKED WITH
 07 CFV M3 IS

  PERSONNEL, ENTER 'P'
   MATERIEL, ENTER 'M' - M
```

Figure 7.146

Notice that as we establish links the program shows the current status. Also we do not have to enter line numbers of secondaries in any particular order.

```
ENTER SECONDARY MATERIEL ITEM NUMBER
 9

YOU HAVE SELECTED 07 CFV M3
 AS A PRIMARY LINK TO 09 AN/VRC-46

IF YOU AGREE, ENTER 'YES' - YES

4 OF 07 CFV M3 ASSOCIATE WITH
 2 OF 09 AN/VRC-46 FOR A RATIO OF .5

SINCE THE RATIO IS LESS THAN ONE,
 IF YOU WISH TO ASSOCIATE
  ONE 09 SCOUT WITH EACH OF THE
   FIRST 2 07 CFV M3 ENTER 'YES' - YES

IF YOU WISH TO LINK MORE WITH
 07 CFV M3, ENTER 'L' -
```

Figure 7.147

From the main menu (Figure 7.141) we select option 3 to enter the linked probabilities. This gets us to a new menu.

```
ESTABLISH ---> PROBABILITIES

 SURLIN - SCOUT PLATOON - PERSONNEL
 SURLIN - SCOUT PLATOON - MATERIEL

   SELECT FROM THE FOLLOWING OPTIONS

ENTER TO GET

 1     DEPENDENT SEQUENTIAL
 2     DEPENDENT SELECTIVE

 3     EDIT INDEPENDENT - PERSONNEL
 4     EDIT INDEPENDENT - MATERIEL

 5     RETURN

ENTER YOUR CHOICE - ?2
```

Figure 7.148

Notice that we could also change any independent probabilities of the original data file.

```
FIRST SELECT A PRIMARY ITEM
 FROM THE FOLLOWING

HIT 'RETURN' TO CONTINUE -
LINKS FROM MATERIEL PRIMARY

PRIMARY IS 07 CFV M3
 SECONDARIES LINKED ARE

ITEM TYPE   ITEM              NR UNITS

PERSONNEL   06 SECT LDR          1
PERSONNEL   08 GUNNER            2
PERSONNEL   07 SQD LDR           1
PERSONNEL   09 SCOUT             1
MATERIEL    09 AN/VRC-46         1

HIT 'RETURN' TO CONTINUE -
```

Figure 7.149

We chose a selective entry process (one primary at a time). The program displays all current linkages. After the last one, it asks for the designation and line number of the primary.

```
DESIGNATE PERSONNEL OR MATERIEL
 FOR THE PRIMARY

IF PERSONNEL ENTER 'P'
 IF MATERIEL ENTER 'M' - M


ENTER LINE ITEM NUMBER - 7
```

Figure 7.150

The next display shows the current linked probabilities for the first secondary (dependent) line item. We have entered no probabilities so far so they begin as zero.

```
CURRENT VALUES WILL BE DISPLAYED

PRIMARY IS MATERIEL 07 CFV M3
 SECONDARY IS PERSONNEL 06 SECT LDR

IF
PRIMARY      SECONDARY IS

IS           CAS

LT            0
MOD           0
SEV           0
SUR           0

HIT 'RETURN' TO CONTINUE -


DO YOU AGREE?

ENTER    'RETURN' TO CONTINUE
         'BY'     TO REDO
```

Figure 7.151

The display implies that during sampling there are four possible states for the primary (CFV M3) lightly damaged, moderately damaged, severely damaged and complete survival.

The implication of linking secondaries to this primary is that the probability chosen for sampling the secondary will depend on the state of the primary after its sampling. Accordingly, we must enter four casualty probabilities for the first secondary in this case.

Figure 7.152 will actually appear on the screen in four parts; we show it in its entirety.

```
SELECT -
GIVEN THAT
 07 CFV M3 SUFFERS LIGHT DAMAGE
  THEN THE PROBABILITY THAT
   06 SECT LDR
    IS A CASUALTY IS
     (CURRENT VALUE IS 0)

ENTER NEW VALUE, RETURN TO ACCEPT - .1

GIVEN THAT
 07 CFV M3 SUFFERS MODERATE DAMAGE
  THEN THE PROBABILITY THAT
   06 SECT LDR
    IS A CASUALTY IS
     (CURRENT VALUE IS 0)

ENTER NEW VALUE, RETURN TO ACCEPT - .3

GIVEN THAT
 07 CFV M3 SUFFERS SEVERE DAMAGE
  THEN THE PROBABILITY THAT
   06 SECT LDR
    IS A CASUALTY IS
     (CURRENT VALUE IS 0)

ENTER NEW VALUE, RETURN TO ACCEPT - .5

GIVEN THAT
 07 CFV M3 SURVIVES
  THEN THE PROBABILITY THAT
   06 SECT LDR
    IS A CASUALTY IS
     (CURRENT VALUE IS 0)

ENTER NEW VALUE, RETURN TO ACCEPT - .05
```

Figure 7.152

```
PRIMARY IS MATERIEL 07 CFV M3
 SECONDARY IS PERSONNEL 06 SECT LDR

IF
PRIMARY      SECONDARY IS

IS           CAS

LT            .1
MOD           .3
SEV           .5
SUR           .05

HIT 'RETURN' TO CONTINUE -


DO YOU AGREE?

ENTER    'RETURN' TO CONTINUE
         'EX'     TO EXIT
         'RE'     TO REDO
SELECT -
```

Figure 7.153

Our entries are displayed and we can continue, exit or redo these entries.

All entries for the five secondaries will now be displayed in lineprint format in Figures 7.154 through 7.158

```
SURLIN - SCOUT PLATOON - PERSONNEL
SURLIN - SCOUT PLATOON - MATERIEL

CONTINGENT SECONDARY PROBABILITIES

PRIMARY IS MATERIEL 07 CFV M3
 SECONDARY IS PERSONNEL 06 SECT LDR

IF
PRIMARY      SECONDARY IS

IS           CAS

LT            .1
MOD           .3
SEV           .5
SUR           .05
```

Figure 7.154

```
SURLIN - SCOUT PLATOON - PERSONNEL
SURLIN - SCOUT PLATOON - MATERIEL

CONTINGENT SECONDARY PROBABILITIES

PRIMARY IS MATERIEL 07 CFV M3
 SECONDARY IS PERSONNEL 08 GUNNER

IF
PRIMARY      SECONDARY IS

IS           CAS

LT            .1
MOD           .3
SEV           .5
SUR           .05
```

Figure 7.155

```
SURLIN - SCOUT PLATOON - PERSONNEL
SURLIN - SCOUT PLATOON - MATERIEL

CONTINGENT SECONDARY PROBABILITIES

PRIMARY IS MATERIEL 07 CFV M3
 SECONDARY IS PERSONNEL 07 SQD LDR

IF
PRIMARY      SECONDARY IS

IS           CAS

LT            .1
MOD           .3
SEV           .5
SUR           .05
```

Figure 7.156

```
SURLIN - SCOUT PLATOON - PERSONNEL
SURLIN - SCOUT PLATOON - MATERIEL

CONTINGENT SECONDARY PROBABILITIES

PRIMARY IS MATERIEL 07 CFV M3
 SECONDARY IS PERSONNEL 09 SCOUT

IF
PRIMARY      SECONDARY IS

IS           CAS

LT            .1
MOD           .3
SEV           .5
SUR           .05
```

Figure 7.157

SURLIN - SCOUT PLATOON - PERSONNEL
SURLIN - SCOUT PLATOON - MATERIEL

CONTINGENT SECONDARY PROBABILITIES

PRIMARY IS MATERIEL 07 CFV M3
SECONDARY IS MATERIEL 09 AN/VRC-46

IF PRIMARY IS	SECONDARY IS LT	MOD	SEV
LT	.2	.1	.05
MOD	.3	.2	.1
SEV	.4	.3	.1
SUR	.05	.02	0

Figure 7.158

Notice that 12 probabilities were entered for the last secondary link. This is a materiel-to-materiel link. Or in everyday terms, if the combat fighting vehicle ends up in some damage condition, it impacts the probability of the radio being damaged. And the radio can have 3 categories of damage. Or in general:

PRIMARY	SECONDARY	PRIMARY STATES	SECONDARY LOSS STATES	TOTAL NUMBER PROBABILITIES
P	P	2	1	2
P	M	2	3	6
M	P	4	1	4
M	M	4	3	12

All entries and displays will automatically be formatted in accordance with user specifications of primary and secondaries.

In this program an item cannot be a primary and a secondary to some other primary at the same time.

Every item will either be independent, primary, or secondary.

The final step after all links and probabilities are entered and linked is to return to the main menu (Fig. 7.137) and select option 4 to sample and then save the survivor files.

Figures 7.159 and 7.160 display the survivors resulting from sampling according to the example linkages and probabilities.

SURLIN - SCOUT PLATOON - PERSONNEL
SELECTED PERSONNEL SURVIVORS

REPLICATION	1	2	3	4	5	6
01 PLT LDR	1			1	1	1
02 PLT SGT	1	1	1	1		1
03 GUNNER	2	2	2	1	2	1
04 SCOUT	2	1	1	1	2	2
05 SCOUT DVR	2	1	1	2	2	2
06 SECT LDR	2	2	2	2	2	2
07 SQD LDR	1	2	2	2	2	2
08 GUNNER	7	5	6	7	4	6
09 SCOUT	4	4	3	3	4	4
10 SCOUT DVR	2	4	3	4	4	3
11 SCOUT	4	4	4	3	4	4
TOTAL	28	26	25	27	27	28

Figure 7.159

SURLIN - SCOUT PLATOON - MATERIEL
SELECTED MATERIEL SURVIVORS

REPLICATION	1	2	3	4	5	6
01 CHEM ALARM						
02 CFV M3	2	2	2	2	2	2
03 IM-74						
04 AN/VRC-46	2	1	2	2	1	2
05 AN/VRC-160	2	2	1	1	2	1
06 CHEM ALARM	2	1	1	2	2	2
07 CFV M3	3	4	4	4	1	4
08 IM-174	2	2	1	2	2	2
09 AN/VRC-46	2	1	2	2	2	2
10 AN/GRC-160	2	3	4	3	3	3
01 CHEM A LT						
02 CFV M3 LT						
03 IM-74 LT						
04 AN/VRC LT		1				
05 AN/VRC LT						1
06 CHEM A LT		1				
07 CFV M3 LT	1				1	
08 IM-174 LT						
09 AN/VRC LT		1				
10 AN/GRC LT	1			1		1
01 CHEM AMOD						
02 CFV M3MOD						
03 IM-74 MOD						
04 AN/VRCMOD					1	
05 AN/VRCMOD						
06 CHEM AMOD			1			
07 CFV M3MOD					2	
08 IM-174MOD						
09 AN/VRCMOD						
10 AN/GRCMOD	1				1	
TOTAL	20	19	18	19	20	20

Figure 7.160